Learning systemic management practice.

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Declaration

I hereby declare that:

(1) The above thesis is my own unaided work, both in conception and execution, and that apart from the normal guidance; I have received no assistance.

(2) Neither the substance nor any part of the thesis has been submitted in the past, or is being, or is to be submitted for a degree at the University or any other University;

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Abstract

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Systems thinking has been proposed as an answer to the question of how management practitioners can best equip themselves to tackle the complexity of management practice. As a body of work intended to transcend disciplinary silos, systems thinking pursues the ideal of generating comprehensive descriptions of real situations. It seeks to do this by embracing a variety of systems approaches and ideas to explain patterns and hypothesise causes of observable empirical events. As systems thinking is a diverse field, there are many knowledge areas and perspectives available to programme designers to facilitate teaching and the learning of systems thinking for management practice.

The purpose of this study is to examine students' experience of learning events in the context of an interdisciplinary course designed for the development of management practice through systems thinking. Data was collected from three cohorts of students by observing lectures and class-based group work; and conducting interviews using conversational repertory grid techniques. The interview responses were analysed using grounded theory principles. Based on the findings derived from this qualitative analysis, the process of learning of systems thinking is outlined as a practice involving the selection and interpretation of events which evolve from the *starting out* phase, where students become interested in learning, and then outlines progress through the phases of *assimilation* and, *changes in knowledge*, culminating in more complex learning phases described as *integration and adaptation*. The synthesis of these phenomena as a theory provided an answer to the primary research objective of investigating *how students experience learning events designed to develop systemic management practice.*

Critical realism, following Bhaskar's philosophy, is used to frame explanations to extend the grounded theory analysis, seeking to account for generative mechanisms that enable and constrain student experience with respect to systems thinking development. As a secondary contribution, this informed the identification of possible mechanisms and emergent properties at the level of the course through an analytical separation of the academic and work environments. These included the discourse of the context of application, academic discourse and professional identity.

In combination, these findings make a contribution to understanding the learning of systemic management practice. In addition, applications for this research are suggested for educators, managers and organisations. These applications include: 1) a framework to help educators design meaningful experiences for learners; 2) a basis for understanding what constitutes systemic management practice and explaining differential development; 3) establishment of a basis for understanding what is needed for organisations to support the development of systemic management practice.

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Glossary

Term/word/acronym	Definition
Agency	The specific powers of human individuals (Elder-Vass, 2010, p. 88).
Androgogy	Art and science of helping adults learn (Knowles, 1980, p.43).
Autopoiesis	A composite unity whose organisation can be described as a closed network of productions of components that through their interactions constitute the network of productions that produce them, and specify its extension by constituting its boundaries in their domain of existence is an autopoietic system (Maturana & Varela, 1987 p.349).
Emergent properties	An emergent property is a core systems concept. It can be described as a property resulting from the whole system that is not a property of the parts of the system. Gharajedaghi (2011) explains that they are a product of the interactions, rather than a sum of the actions of the parts. Life is often used as an example of an emergent property of organisms as systems which cannot be explained by the parts of the organism such as the body organs (Midgley, 2000; Gharajedaghi, 2011). When describing a classroom as a system, with teacher and students engaged in activities, learning can be conceived of as an emergent property of interactions which is only partially influenced by the teacher in this system.
Generative mechanisms	A generative mechanism is a potential emergent property or a causal power that results from a particular structural configuration. Such mechanisms are relatively enduring and their interplay generates the actual pattern of events and behaviours. Mingers (2000, p. 1264).
Holism	A way of thinking that is attentive to wholeness, being the apparent tendency for living systems to produce complex wholes with properties that cannot be predicted from the properties of their parts (Sterling, 2003 p.44-45). All systems thinking is holistic but not all holistic thinking is systemic.
Knowledge	Considered a polyvalent term in this thesis, distinct from conceptualisation of knowledge as a commodity. Four forms (from Mingers, 2006): Propositional knowledge Experiential knowledge

	Performative knowledge Epistemological knowledge
Learning events	In the context of this study: Events from the perspective of students (defined in interviews) as intended for or had the consequence of learning. For example, a learning event may not have the desired consequence of learning and/or learning events where something was learnt.
Management development	Presented in the literature as a field in management research referring to: non-degree or qualification programmes or courses or on-the-job experiences offered for improvement of managerial knowledge and skills. Traditionally associated with Human Resource Development. More recently has become less distinct from management education in programmes which integrate real-world practice with formal education. In this thesis, management development includes efforts in formal education for improvement of managerial knowledge and skills for application in the workplace.
Management education	As a field in management research distinct from management development, learning and training, the term refers to formal programmes offered by universities or institutions linked to a qualification in management.
Management learning	Transcending education and development, not considered context-specific, learning as contributing to management knowledge and skills can take place in formal and other environments. As an area of research, it draws on a number of fields or subfields including adult learning.
Pedagogy	Formation of a set of principles upon which teachers can assist students in moving effectively and efficiently from a relative state of ignorance to a state of well-found knowing (Barnett, 2009, p.432).
Pedagogic activities	Activities based on pedagogy.
Pedagogy of learning	Exploring the conditions that might be conducive to bringing about learning (Marton & Tsui, 2004).
Structure	Causal power of specific social groups (Elder-Vass, 2010, p. 86). Note: More detail is provided in the body of the thesis.
Structural coupling	Occurs when a unity, through ongoing recurrent interactions with its environment (including other unities), establishes a structural congruence

	between itself and its environment (Kay, 2002, p.529).
Systems approach	A systems thinking approach does not view problems as discrete but sees them as related to all aspects of an organisation. Organisations are composed of interrelated systems and processes, and any change in one organisational aspect affects all others. A *systems thinker* would therefore consider the interrelationships among systems and processes of the organisation before implementing the solution. That solution will be evaluated on the basis of all results produced. Further, there is the recognition that not only do circumstances change, requiring new solutions, but solutions require new circumstances (Montana & Charnov, 2000, p.92).
Systems as discipline	An inclusive name for the various schools of systems thinking that emphasise systems as a *methodology* (Sterling, 2003, p 44-45)
Systems inquiry	Conceived of as a system of three interrelated and internally consistent aspects: systems theory, systems philosophy, systems methodology (Bánáthy, 1992).
Systems thinking	Modes of thinking which recognise relationship and process as the primary reality (Sterling, 2003, p.44-45).
Systemic thinking	This term is sometimes used synonymously with systems thinking. However, some writers use this term to distinguish between first-order systems thinking and second-order systemic thinking whereby the observer is fully cognisant of his/her own construction of his/her own reality, including his/her view of any system (Sterling, 2003, p.44-45).
Systemisism	A belief or view that 'systems' is an appropriate metaphor for understanding the world, our interrelationship with it and acting in it. A related term is used to describe the systems practitioner, as in 'systemisist' (Sterling, 2003 p.44-45).
Unity	Within the context of autopoiesis: That which is distinguishable from a background, the sole condition necessary for existence in a given domain. The nature of a unity and the domain in which the unity exists are specified by the process of its distinction and determination; this is so regardless of whether this process is conceptual or physical (Maturana & Varela, 1980, p.138).

Chapter 1: Introduction

Introduction

In post-apartheid South Africa, the shortage of managerial and professional skills (Chandra, Moorty, Rajaratnam & Schaefer, 2000; Nienaber, 2007) continues to be a factor which is perceived to have a negative impact on economic growth. In addition, the environment in which effective managerial competencies are required is now considered to be characterised by complex and dynamic local and global influences. These influences include a rapid rate of change in the economic, social, political, technological and environmental arenas, which has contributed to change in the nature of work and the composition of the workforce (April & Peters, 2010). For example, South African legislation such as the Labour Relations Act 66 of 1995, Basic Conditions of Employment Act 75 of 1997, Employment Equity Act 55 of 1998, Skills Development Act 97 of 1998 and South African Qualifications Authority Act 58 of 1995 (Nienaber, 2007) were introduced to govern labour practices, improve workers' skills and to seek redress from the effects of the apartheid regime.

This evolution of the industrial and business environment does not only present challenges in developing countries like South Africa. Developed countries are also concerned as to whether their managers are adequately prepared to contribute effectively to ensure growth and business sustainability (for example, see Atwater, Cannan & Stephens, 2008). Birchall (1999) cautioned that managers would need to be prepared at an organisational and personal level to adapt quickly to the changing needs of the businesses in which they work. Effective management not only requires adapting to change but also demands an ability to anticipate the changing needs of the business. This would, in Birchall's view, require personal development, which prepares managers for "new roles and ways of working" (Birchall. 1999, p.77). This assumes that working with the transformation of individuals can produce agents for improvement within organisations who contribute to both economic growth and society as a whole. Managers therefore carry a societal burden as they are considered to impact the lives and livelihoods of people generally, and of being in a position to have "influence in shaping moral, economic and ecological conditions" (Alvesson & Wilmott, 1992, p.1).

This need for management development has been recognised by organisations, management scholars and educators, as well as researchers and practitioners, who have theorised and attempted to meet these needs in a variety of ways (Vince & Elkjaer, 2009). A number of these efforts have been documented in journals which focus on management development and training, management education and management learning. The number of journals in this field has increased significantly in the last decade. These publications document the critique and evolution of management thinking about education, development and learning. Ghoshal (2005) and Starkey, Hatchuel and Tempest (2004) are among those who note that the attempts at addressing problems through management

education have in many cases not only failed but have also contributed to exacerbating them, resulting in a complicity which has dysfunctional consequences for society. Ghoshal (2005) based his analysis on the ideologies and theoretical premises on which much of management education is based, noting that these assumptions become self-fulfilling prophecies as managers "adapt their behaviours to conform with the doctrine" (Ghoshal, 2005, p.77).

In a special issue to mark the 25th anniversary of the *Management Learning Journal* (formerly known as *Management Education and Development Journal*, *MEAD*), James and Denyer (2009) present an analysis of articles, noting a move towards privileging more scholarly approaches at the expense of more practical offerings which could guide the practitioner in the design, delivery and assessment of management education and development programmes. This shift echoes Ghoshal's concerns that the focus on scholarship has narrowed in the business schools: "Those with primary interests in synthesis, application, or pedagogy have been eliminated from our milieu or, at best, accommodated at the periphery" (Ghoshal, 2005, p.82).

The contributions of James and Denyer (2009) and Ghoshal (2005), among others, therefore challenge those who conduct research in management education, development and learning, to be reflective of our ideologies and our theoretical assumptions, and to produce good theories which have value beyond illuminating and explaining. These theories should be relevant and support educational practitioners in designing and delivering pedagogy for management learning.

The intention of this chapter is to introduce the topic and motivate the need for the study. Hereafter the chapter proceeds with the story of this research project, which includes a discussion of key concepts in systems thinking, followed by a summary. The chapter concludes with an outline of the thesis.

1.1 Background to the study and the research problem

> *Systems education must surely be seen as one way of improving the human condition. Hopefully such education will produce systems thinking decision makers who will be better equipped to understand the complexities of our society and who will, in future, play their parts in improving both the quality and stability of our social systems.*
>
> Janes (1979, p.836)

From Janes's quotation above, systems education was and is perceived as a response to the need for decision makers who could deal with and contribute to societal improvement in the face of complexity. As noted above, despite innovations in pedagogical practices and curriculum design, management education literature continues to be littered with failed attempts to impact upon management practice or to contribute to improvement or resolution of the many problems faced by

individuals, managers and organisations. Coase (1988) and others (e.g. Sterman, 2002) noted that changes associated with corrective measures might well produce more harm than the original deficiencies that characterise problem situations do. Ackoff (1981a) refers to the different categories of problems which managers face as "messes" where problems are connected to other problems. He argues for an integrated, systemic approach as an appropriate response to the complexity of problems spawned by the changing environment.

Systems thinking as a broad response to the challenges of the 21st century has been supported by a number of influential scholars and practitioners (for example, Ackoff, 1994; Checkland, 1981), some of whom have contributed to the development of systems theory programmes in management at higher education institutions. These programmes for undergraduate, postgraduate and non-degree purposes (for example, in business executive programmes) are viewed as the means for dealing with management problems and as a design for management development and management education. In South Africa, particular programmes for management education and development at the University of Cape Town and University of Natal are examples of this approach. In addition to programmes that focus specifically on systemic approaches to the curriculum and to solving complex problems, systems thinking has become part of management and business education discourse (for example, see Atwater et al., 2008; Adam, 2004). Atwater et al. conducted a study in the United States of America (USA) in 2008, in what they describe as the top universities, concluding that systems thinking is considered by these institutions as a means of integrating management disciplines in order to solve the kinds of problems that managers encounter. Despite this observation, many of these university programmes did not explicitly offer systems thinking as part of their business school curricula, nor did they incorporate systems thinking in their curricula. In a review of the recent contributions of systems thinking to management science and operational research, Mingers and White (2010) concluded that although applications of systems enjoy a healthy quantity and variety in operational research and management science, systems ideas are not well established in academic departments.

While the value of the principles of systems thinking in management education may not be in dispute, concerns raised by key authors include questions as to what the body of knowledge in systems thinking looks like, given the variety of systems ideas and systems approaches available. There are also concerns about the quality of the application of systems ideas in dynamically complex environments, i.e. environments with a number of interacting variables and agents. Recent debates, such as those documented in a paper on systems-orientated university curricula by Jones, Bosch, Drack, Horiuchi and Ramage (2009), raise questions for consideration by management educators who draw on systems thinking: Jones, et al., (2009, p. 2/15) ask: "What concepts must a person know in order to call him/herself a 'systems scientist?'" and "Can we define a systems science body of knowledge?". In contrast to the focus on systems thinking as a body of knowledge, researchers (e.g. Salner, 1986) have advocated a focus on the ability of individuals to use systems thinking to solve

practical real-world problems. The latter approach would see decisions as to what to include as systems knowledge in management curricula based on pragmatic choices (for example, see Jones, et al.) with an emphasis on how students learn. Bosch, Maani, McIntyre, Ossimitz, Ramage and Vesterby (2010), in a publication emanating from discussions of systems educators in 2010, describe systems education as "highly fragmented, both intellectually and pedagogically" (p.3).

Concerns about the quality of student learning of systems thinking have been raised from the perspectives of different schools of systems thinking, Sweeney and Sterman (2000) and Salner (1986) are among those who have raised these concerns. In a study conducted by Sweeney and Sterman (2000) with students at the Massachusetts Institute of Technology (MIT) Sloan School of Management, they concluded that students' understanding of basic aspects of complex systems was poor. In their study, students' knowledge of concepts such as stock and flows and time delays, central to the systems dynamics domain of systems theory, were tested.

These concerns raised by authors pertaining to the absence of a cohesive, generally accepted curriculum to guide systems educators, and the quality of learning and application of systems thinking, are of relevance to this research study. The purpose of the section that follows is to introduce systems thinking in three ways: as incorporating a range of perspectives from which the world could be viewed; as an approach for conceptualising and addressing problems; and as a means of informing the design and application of interventions to deal with these problems.

1.1.1 Introduction to systems thinking and practice

As a construct informing this research study, systems thinking or systemic thinking presents a number of challenges; these challenges are considered here by drawing on a selection of literature to provide a context for these constructs. Explanations of how these constructs are informed by philosophical assumptions and how they align with theoretical perspectives are provided.

Challenges of systems thinking as a construct

A review of literature on systems theory reveals a plethora of views and definitions of what constitutes the subject. Mingers and White caution that "given the vast extent of the systems literature, and that systems can be applied in almost any domain, it is impossible to be in any sense comprehensive" (2010, p.1147). A brief historical background and overview of systems thinking using selected authors is therefore presented in the introduction to this section.

Ludwig von Bertalanffy, a biologist, is widely credited with developing General Systems Theory (GST) in the 1940s in an attempt to revive the universality of science and create a common language across disciplines as an alternative to reductionism (e.g. Ackoff, 1974; Jackson, 2000). Describing GST as a discipline where the boundaries of specialised disciplines are transcended by considering

the characteristics common to all systems, von Bertalanffy proposed general systems theory as a *logico-mathematical* (1950, p.139) language for describing these commonalities. The contribution of von Bertalanffy, together with Wiener's work in cybernetics, is acknowledged by Jackson as giving birth to "systems thinking as a distinctive area of research" (Jackson, 2000, p.51). Midgley (2006) added complexity science to cybernetics and GST, citing them as themes which characterise the early period in the evolution of Systems Thinking, noting that while these ideas remain active in the systems research community, critique of the assumptions and practice of these ideas has led to new systems paradigms. It is due to this diversity of systems paradigms and methodologies that Midgley avoids defining terms such as *systems thinking* and *systems practice* (Midgley, 2006). He states that while it is possible to view systems thinking as a holistic way of thinking and that many concepts are common across different paradigms, "as soon as we dig beneath the surface, the meanings of these concepts are inevitably contested, or what is left unsaid by focusing only on a limited set of words becomes too important to ignore" (Midgley, 2006, p.12). This is well illustrated with a definition provided by Checkland (1981). In his seminal book, *Systems Thinking, Systems Practice*, Checkland defines *systems thinking* as the "conscious use of the particular concept of wholeness captured in the word 'system', to order our thoughts" (1981, p.4) and *systems practice* as the use of the "product of this thinking to initiate and guide actions we take in the world" (1981, p.4). Checkland's definition presents systems as "mental constructs of observers" (Jackson, 2000, p.3) where systems are defined in terms of the perceptions and distinctions drawn by people. To illustrate the point made earlier, this represents a shift from the paradigms which described systems as, "entities with an objective existence in the world" (Jackson, 2000, p.3), reflecting instead the interpretive paradigm which characterises Checkland's work.

Midgley (2000) and Jackson (2000) have both attempted to draw together the vast and varied perspectives on what constitutes systems thinking and practice. While they have used different approaches to document the developments in the field, there is general agreement within the categories they have selected. While these models provide a useful historical guide, the development of systems thinking was by no means a sequential series of events. Thus, there are developments which can be connected (e.g. in Midgley's waves of development) while other developments could be considered as discrete events likely to be informed by factors other than previous systems ideas. Midgley (2000) uses a wave metaphor to outline three phases of Systems Thinking (see Table 1.1), where each wave is based on the adaptation of the ideas from preceding paradigms. Jackson (2000), writing for an audience of management practitioners and researchers, takes a different approach, providing a classification using social theoretical perspectives which have either implicitly or explicitly provided frameworks of ideas on which systems approaches have been constructed. These include functionalist, interpretive, emancipatory and postmodern approaches. As each of these approaches embodies particular ways of viewing the world, with corresponding theories,

methodologies, systems models and methods, they are considered by Jackson (2000) to have strengths and weaknesses and to be more or less appropriate to particular problem situations and purposes. A summary of these paradigms and related systems traditions appear in Appendix A1.

Table 1.1 Three waves of systems thinking (derived and expanded upon from the ideas of Midgley 2000, 2006).

Period	Key features	Examples of key proponents	Methods	Role of intervener	Critique	Implications for teaching and learning
1950-1970s: First wave of Systems Thinking	Emphasis on quantitative applied science; description of systems in physical terms. View of human beings as objects to be manipulated in the system.	Von Bertalanffy (1950, 1968), Boulding (1956).	Systems dynamics (quantitative modelling)	Systems modeller	Use of models as representations of reality, rather than as aids for understanding. Role of systems intervener as expert. Lack of involvement of stakeholders. Lack of consideration of power relationships.	Knowledge resides with the expert who presents the objective best way to deal with issues. Learning of concepts, modelling, systems methods etc. Models are a reflection of reality.
1970s to 1980s: Second wave of Systems Thinking	Systems seen as constructs to aid understanding; Focus on participation in interventions.	Churchman (1979), Ackoff (1981), Checkland (1981).	Strategic Assumption Surfacing and Testing (SAST). Interactive planning. Soft systems methodology. Systems dynamics (as a device for communication between stakeholders).	Facilitator	Participative methodologies did not sufficiently account for power relationships within systemic interventions. Absence of a clear theory of society, i.e. did not account for conflicts built into the structure of society. The local focus of the second wave results in an adaption to potentially unjust political and economic	Pluralistic, accepts that multiple perceptions of reality exist. Models explicate world- views rather than represent the truth (Jackson, 2000). Understanding of views as multiple truths.

					situations rather than cultivating emancipatory interest.	
1980s to present day: Third wave of Systems Thinking	Addressing limitations of previous approaches, identified as disregard for impact of power relations in interventions and in the broader structure of society; critical boundary judgement; pluralism in intervention practice.	Ulrich (1983), Jackson and Keys (1984), Jackson and Flood (1991), Flood (1995), Taket and White (1993), Jackson (2000), Mingers (1997, 2006).	Critical Systems Heuristics (CSH). System of systems methodologies (SOSM). Critical Systems Thinking (CST). Total Systems Intervention (TSI). Pragmatic approach (i.e. eclectic combination of methods). Multimethodology. Complexity theory.[1]	Interveners	Mingers and Brocklesby (1996): Critique of methodological pluralism includes: Paradigm incommensurability: Different ontological and epistemological roots of paradigms; Cultural: extent to which academic and organisational cultures militate against combining paradigms; and Psychological: Individual agents demonstrating preference for particular paradigms or need for knowledge of a range of paradigms and methods.	Need for making judgements as to boundary and methodology to fit problem situation. Understanding of assumptions underpinning philosophies. Understanding of context in determining truth.

[1] Although complexity theory is acknowledged by many systems theorists as a form of systems thinking or as complementary to systems thinking (e.g. Flood, 2010; Midgley, 2003; Jackson 2003; Phelan, 1999), this is a matter of debate. Systems thinking has also been contrasted with complexity theory (Stacey, Griffin & Shaw, 2000).

It is apparent that Systems Thinking is a dynamic and evolving field with a number of key thinkers, paradigms, models and methodologies. Given the variety of approaches and methodologies, what common ground remains to unite them as systems thinking and to inform the curriculum content for courses which incorporate systems theory and practice? A number of systems scholars (such as Midgley, 2000; Jackson, 2000; Gharajedaghi, 2011) have addressed the first part of this question, referring to concepts, ideas, core systems notions or critical principles shared by the systems traditions. Midgley describes the systems movement as being united by the aspiration to find a comprehensive understanding and a philosophical view in opposition to mechanism, reductionism ("reduction of phenomena to simple, objective, causal relationships") and subject/object dualism (separation of the observer from the observed, creating the illusion of objectivity) (2000, p.39). Jackson (2000) adds to these with a more practical focus, identifying three core systems notions common in systems approaches, namely:

1. A commitment to holism, in the systems sense of the whole being more than the sum of the parts as the interactions between the parts are also considered (this is in contrast to the whole as equal to the sum of the parts);
2. The organisation of knowledge as cognitive systems; and
3. The provision of practical approaches to problem solving.

Midgley (2000) refers to the preoccupation of systems thinkers with holism, noting that genuinely comprehensive analysis is impossible. Instead, exploring different *boundary judgements* for making decisions about what to include and what to leave out of systemic analysis has become central to systems thinking.

The boundary concept is discussed further below both as a key systems thinking concept and to illustrate how such a concept can be approached in curricula for courses which incorporate systems theory and practice.

Boundary concept

The centrality of the boundary concept in systems theory is based on the recognition of the limitations of our understanding when pursuing the ideal of comprehensiveness. While it reminds us that all understandings are incomplete (Midgley, 2003), it serves as a construct to guide choices when analysing problems and designing and implementing actions. For example, in complex managerial environments with multiple stakeholders who have different interests, defining the problem in a way that informs the action to be taken requires that a boundary be drawn. This boundary will define both "*what issues* are to be included, excluded, or marginalized in analyses and *who* is to be consulted or involved" (Midgley, 2003, p.89). These judgements have ethical consequences, as some stakeholders may be privileged over others, and are value-laden.

Mingers agrees with Midgley's view of the importance of the *boundary* concept, describing the drawing of a boundary as "the most primitive systemic act that one can perform" (2006, p.65). Identifying social systems by deciding on the boundary and thereby what constitutes the system is, however, "extremely contentious because of major debates about the nature of the social world" (Mingers, 2006, p.83). Mingers (2006) explores social system boundaries by considering the following (Table 1.2):

Table 1.2 Social Systems Boundaries

	Social systems boundary	**Explanation**
Observer independent	***Social membership***	Being a member of a social group, or registered for a particular course or programme, implies that there is a clear boundary between those who belong and those who do not. While these groups may be formal or informal e.g. the family or academic community, there will be defined criteria for membership and clear procedures for joining or leaving the group.
	Social systems	Mingers presents an argument which concludes that although it may be possible to define a social system in some instances, "it is difficult to identify specific social systems that are clearly bounded and have identity" (2006, p.85). He demonstrates his argument with a number of examples, noting that there are greater differences within notional society, e.g. ethnic and cultural groups, than between one society and another.
Observer dependent	***Systems boundaries as constructs***	Boundaries as constructs are an alternative to systems boundaries where they are unproblematic, and independent of the observer. For example, Checkland reminds us that we have no access to the reality of the world, and therefore only have an epistemological view of systems, i.e. instead of saying "it is a system", we can say "it may be described as a system" (Checkland, 1983, p. 671; Checkland in Mingers, 2006, p.87). The observer therefore decides where the boundary is and as such, what is included and excluded from the system. In critical realist terms this would refer to descriptions of systems in the empirical domain.

	Systems boundaries as process	Midgley (2000) shifts the description of boundaries from thinking of the nature and content of boundaries to the process by which boundaries are constructed or generated. This is an original approach which is described in more detail in Midgley (2000, Chapter 4) and Mingers (2006, p.89-93).

Mingers argues against observer-dependent views of systems boundaries as credited to, for example, Checkland, advocating that systems boundaries can exist independently of human observers in the world. According to Mingers (2006), while our work as systems theorists and practitioners will always remain in the *transitive* or epistemological domain, our humanly-constructed systems models must be models of the *intransitive or* ontological domain (explained in more detail in Chapter 2, section 2.1), i.e. they must attempt to account for reality. These may reveal boundaries that are causally active, thereby revealing that they exist.

Therefore, as a concept central to systems thinking and practice, learning to make boundary judgements has both theoretical content and metacognitive components which involve awareness and reflection on where and how boundaries are drawn when conducting inquiry.

Applications for the study of interest

A definitive definition for systems thinking has not been resolved in this section. Instead, the research study is designed to acknowledge the breadth of interpretations of the terms *system* and *systems thinking*. The grounded nature of the process of data analysis also requires an approach which accommodates a variety of interpretations of terms by participants in the study. The view taken in this thesis concurs with Midgley's (2000) view that "we need not get trapped into any of these 'either/or' positions in the way we view systems" (p.150) and that it is possible to accept ways of understanding systems and their boundaries as "real world entities, personal constructs *and/or* dialogical phenomena" (emphasis in text) under certain conditions.

However, as definitions reveal assumptions which can be described in philosophical terms, the philosophical positions taken, which are discussed in detail later in this thesis, will inform the interpretations of key terms.

1.1.2 Philosophical considerations in systems thinking

With the recognition of the variety of conceptual and methodological approaches incorporating systems principles and ideas, there have been attempts to establish coherence in the field by explicating the philosophical assumptions of systems theory and practice (e.g. Ulrich, 1988; Mingers, 2000, 2003; Midgley, 2000). According to Bánáthy (1992) systems philosophy asks the questions:

"How can we understand systems? How can we inquire about them? What is the best way to think about them?" (Bánáthy, 1992, p.10).

Checkland defended systems thinking as an "epistemology" (1981, p.318), writing at the time that systems thinking requires a *knowing subject* (emphasis in text, Checkland, p.101) who would, for her own purposes, use systems thinking to describe entities as coherently organised wholes instead of using descriptions which disaggregate entities as in reductionist methods of science. In an earlier publication, Checkland (1979) describes a system as "a means of notating the real-world in a way which may or may not map onto reality; above all it is a notation chosen by an observer, a contribution to epistemology before it is a possible contribution to ontology" (1979, p.135). This view, as can be read in Table 1.1, encompasses approaches described in the second wave of systems thinking.

Salner also takes an epistemological view of systems theory, describing epistemological assumptions apparent in the diversity of systems practice as "epistemological inconsistency (in) a field that is striving for coherence and organisation" (1986, p.229). She argues that Checkland's description of a system is consistent with Perry's epistemic stage of contextual relativism. In Perry's (1970) theory of epistemic development, contextual relativism recognises the centrality of contexts in defining truth and value as opposed to acontextual and value-neutral practices and observations.

Critical realism and pragmatism

The philosophical traditions of critical realism and pragmatism have been argued to have assumptions consistent with systems ideas (for examples, see Mingers, 2000, 2006; Britten and McCallion, 1994). Critical realism, as derived from Bhaskar, offers an ontological framework for explaining the role of the individual in relation to describing entities as systems and a reality including and beyond the individual. In critical realism the tension is not between the system as described by the observer and the system as it exists independently of observation. Rather, in critical realism, each of these positions has legitimacy as three overlapping domains of reality are acknowledged. The domain of the *real* includes causal structures and generative mechanisms which "exist and act independently of the conditions which allow men access to them" (Bhaskar, 1998, p.41), the *actual* domain are activities or patterns of events generated when the causal mechanisms are activated and the experience of these events constitutes the *empirical* domain.

In seeking to explain social behaviour, systems theory attempts to hypothesise causal relationships as systems in the *real* domain (Mingers, 2000a). These theoretical explanations of the causal mechanisms which, if they existed, would account for the observable empirical events is known (in critical realism) as *retroduction* i.e. "positing mechanisms which, if they were to exist and act in the postulated matter, would account for phenomena singled out for explanation" (Lawson, 1998, p.164).

With a critical realist philosophy of systems theory, our understanding of how systems are described therefore moves beyond interpretivist and consequently empirical explanations alone. Mingers (2000a) outlines how different approaches to systems thinking can be explained from a critical realist stance. Ranging from the systems dynamics approaches which form part of the first wave of systems theory to statistical modelling and soft systems approaches which characterise the second wave, Mingers (2000a) makes a case for a critical realist philosophy of systems theory. In a later publication, Mingers (2003) includes the three wave approaches in his analysis.

Mingers (2006) distinguishes between systems in different domains, for example, the physical domain versus social and economic domains. He notes that the social and economic domains have more complex interactions between their components and the wholes are not clearly separated out. Identifying systems is therefore more dependent on the choices of the observer (Mingers, 2006) who would need to delineate boundaries in order to notate systems. Moving towards more physical domains, natural wholes as systems would be more apparent and would meet the following criteria when applied to the intransitive domain of systems thinking:

1. *The systems possess characteristic(s) or behaviour(s) that are only attributable to the systems as a whole by virtue of it being a whole. They are not attributable to the parts. This implies that the systems must be able to be clearly distinguished as a whole separable from its environment.*

2. *The system consists of parts and relations between the parts (its structure) that together are necessary in order to generate the characteristics of the systems as a whole. In some cases this will include specific boundary components but this is not a necessity.*

3. *The relationship between parts and whole is recursive – the parts themselves may be whole systems.*

(Mingers, 2006, p.70)

Pragmatism is orientated to "usefulness" (Jackson, 2000, p. 45) and has been linked to systems thinking by a number of key authors (for example, Jackson, 2000; Britton & McCallion, 1994). Pragmatism, following the tradition of Charles Saunders Peirce, sought to find a universal basis for validating knowledge in action (Midgley, 2000). Midgley takes up the argument for the understanding of pragmatism to extend beyond the popularist views of that which atheoretically works in practice. He describes pragmatism as a notion which "requires significant effort of inquiry to ease out the assumptions underlying what it means to say that something 'works'" (Mingers, 2000a, p.108). A cornerstone of Peirce's work is the Scientific Method as a process of inquiry which incorporates three modes of inference, namely abduction, induction and deduction. These resemble retroduction

(mentioned earlier) as a thought process that moves "from knowledge of one thing to knowledge of something else" (Danermark, Ekström, Jakobsen & Karlsson, 2002, p.96). The specific characteristic of retroduction is to infer beyond explanations for empirical observations to developing concepts which provide explanations for underlying mechanisms and conditions which give rise to observable phenomena and events. This explanation provides parallels with systems approaches, as it requires the researcher to hypothesise causal mechanisms which could account for observable empirical events. Corson (1991) considers Bhaskar's critical realism to extend beyond pragmatism (according to the tradition of Dewey rather than Peirce) noting that understanding and consequently change is only possible if we identify the underlying structures at work.

The relevance of systems philosophy to this thesis comes from its ability to illustrate that the concept of systems thinking is not unitary and can embrace more than one ontological and epistemological position. This pluralist approach indicates that one view of systems is not necessarily more legitimate than another. The legitimacy of a concept would therefore be contingent on its coherence with an appropriate philosophical framework.

1.1.3 Considerations for systems practice

Designing and implementing interventions is an essential focus of systems approaches to management practice. Midgley (2000) calls for theoretically informed approaches to interventions that integrate philosophy, methodology and practice, in order for systemic intervention to flourish. In his argument, Midgley (2000) proposes that an adequate methodology for systemic intervention needs to be explicit about three things:

1. Reflecting upon and making choices between boundaries;
2. The need to make choices between theories and methods to guide actions, i.e. methodological and theoretical pluralism; and
3. Taking action for improvement.

This approach is intended to inform desirable and sustainable improvements, known in systems parlance as solving the right problem. In this regard, Bánáthy (1999) says that the selection of methods and methodological tools or approaches in systems inquiries is based on the best fit for the problem situation, the context and the type of system identified by defining the boundaries of the problem situation.

There are a number of other authors who also propose strategies for the choice and mixing of methods (for example, Mingers & Brocklesby, 1997; Jackson, 2000; Clarke, 2001; Mingers, 2006). While there are clear references to distinctions between methodology and methods in a range of literature, Midgley's (2000) definitions are used in this thesis. He defines a method as a set of techniques

operated in a sequence (or sometimes iteratively) to achieve a given purpose; a methodology would include the theoretical ideas that justify the use of a particular method or methods.

Jackson (2000, p.308) describes the System of Systems Methodologies (SOSM) as a "landmark" in the history of mixing methodologies and methods in systems thinking. In an attempt to aid methodology selection, Jackson and Keys (1984) produced SOSM which was intended to align methodologies with appropriate problem contexts (see Figure 1.1). The horizontal axis represents a continuum of increasing divergence of the values/ interests of participants (concerned with or affected by the problem situation) while the vertical axis shows a continuum from simple situations with fewer elements to complex situations characterised by many, highly interrelated elements. The SOSM allows choice between various methodologies and their associated paradigmatic assumptions; it is therefore considered to be meta-paradigmatic (Flood, 1990).

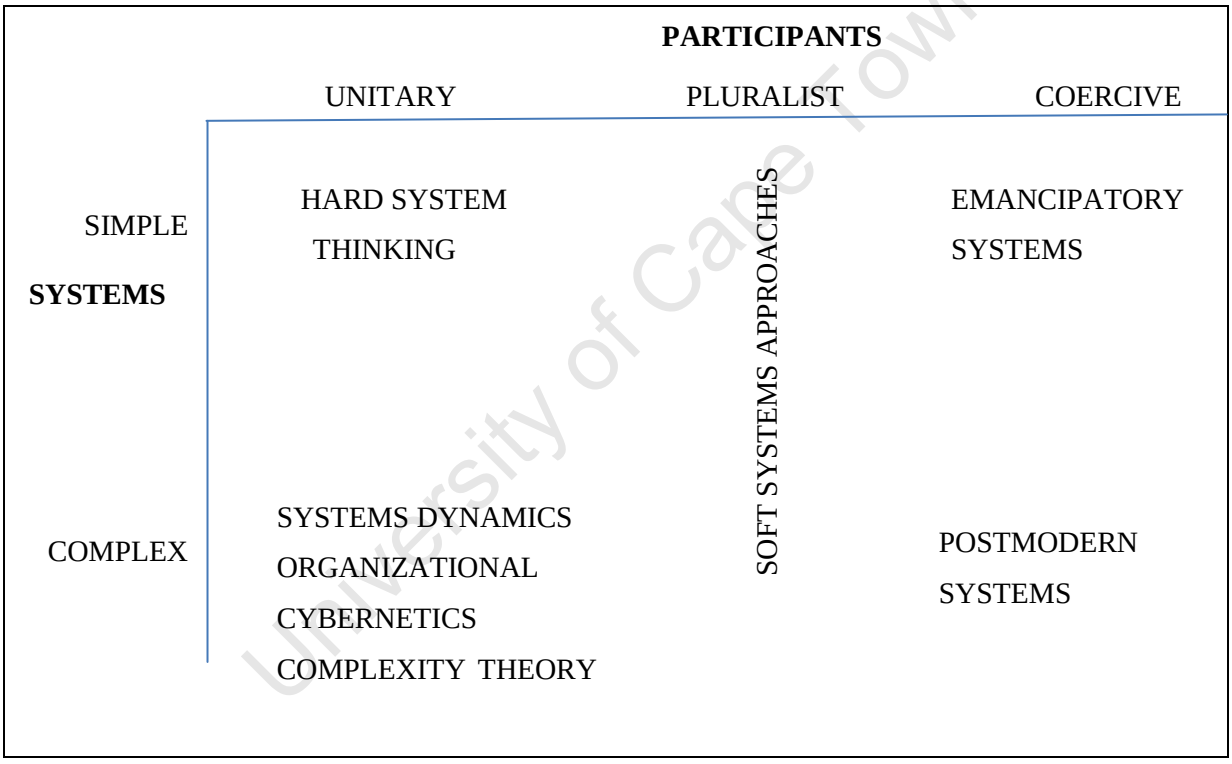


Figure 1.1 Systems approaches related to problem contexts in the System of Systems Methodologies (SOSM) (Jackson, 2003, p.24)

Since this development, systems practice has seen a number of possibilities emerge for combining methodologies, referred to by Mingers as multimethodology. This includes *critical pluralism* (Mingers, 1997), *coherent pluralism* (Jackson, 2000), *discordant pluralism* (Gregory, 1996), *pragmatic pluralism* (Taket & White, 1996) and *theoretical pluralism* (Midgley, 2000).

The significance of these developments in systems thinking was the introduction of methodological pluralism, allowing for the integrated use of different methodological ideas and the use of a wide range of methods in support of particular purposes. To illustrate how these ideas could be integrated,

an example of the problem of how to improve the throughput rate in an undergraduate course is used:- Quantitative statistical methods to represent student performance could be used in combination with interpretive methods to capture perspectives of different stakeholders, such as soft systems methodology (SSM) or causal loop diagrams (systems dynamics modelling).

Ulrich (2003) argues for a more discursive understanding of systems practice. In doing so, Ulrich's approach asks for more from systems practice than solving problems through making the most appropriate methodological choices. He also goes beyond conventional notions of reflective practice, presenting an alternative in his proposal of "critically systemic discourse" (Ulrich, 2003, p.339). The five principles which Ulrich uses to illustrate critical systemic discourse (CSD) are outlined in Table 1.3. Ulrich's views emphasise the thinking and critical engagement (both in the sense of dealing with power, i.e. emancipatory, and questioning, e.g. critical thinking) required when applying systems thinking in practice.

Table 1.3 Ulrich's five principles of critically systemic discourse (CSD).

Principle	Description
Discourse	• Reflective practice depends on argumentative, discursive reason • Critique rather than consensus theory of truth
The role of civil society	• Emancipatory view of discourse as offering not singular but ongoing opportunities for members of society to articulate locally suppressed concerns
Emancipatory orientation	• Emancipation as a methodological effort to secure authentic discourse as opposed to an ideological effort • Emancipatory reflection and discourse conceived as a requirement for reflective practice • Adopt the principle of emancipatory, systemic boundary critique
Systemic boundary critique	• Process of systematic revisions of boundary judgements • Boundary critique methodological principle through which CSD realises an emancipatory orientation
Deep complementarism	• Methodological pluralism/complementarism as a principle of openness to different approaches which could shed light on a problem situation • "Deep complementarism distinguishes itself from prevailing,

> shallow conceptions of methodological complementarism by not subordinating emancipatory reflection and boundary critique to methodological choice" (Ulrich, 2003, p.340).

Ulrich's approach can be seen to be characteristic of the third generation of systems thinking, which Gharajedaghi (2011) describes as having to deal not only with the "challenge of interdependency and choice, but also with the implications of cultural prints reproducing the mess, or the existing order, all over again by default" (p.16). Default, in his view, allows the "beliefs, assumptions, and expectations that underlie the system" to go unexamined. Gharajedaghi (2011) refers to approaches which strive to make the beliefs, assumptions, and expectations in systems explicit, with constant monitoring and examination as 'design' approaches. Systems methodology associated with this generation or wave therefore includes methods which involve participation and sets out both to challenge epistemological assumptions and also to acknowledge and address structural and generative mechanisms.

The systems practitioner

When considering requirements of thinking and critical engagement for systems practice as proposed by Ulrich (2003), the view offered by Kitchener (1983), that ontological and epistemological positions which people have in relation to management contexts and particular problems will affect the way they think about and approach these problems, is an important one to consider. These inherent ontological and epistemological assumptions people hold are argued by Kay (2002) to be engendered through the intellectual training based on the scientific method in many disciplines. According to Kay (2002), these positions or world-views are arguably unsystemic. Kay (2002) makes the point that systemic thinking is different from other approaches to problem solving. He quotes the following statement by Checkland and Scholes: "to do systems thinking is to set some constructed abstract wholes (often called systems models) against the perceived real world in order to learn about it" (Checkland & Scholes, 1990, p.25, in Kay, 2002), to illustrate that systemic thinking requires an ability to abstract appropriately. For the nature and level of appropriate abstraction he draws on Salner's (1986) work. As noted earlier, Salner (1986) took the step of identifying context-relevant knowledge development as necessary for systems thinking.

Mingers agrees that human experience is limited by our "perceptual and linguistic apparatus" (2000c, p. 749), advocating that we value observer-dependent, epistemologically-framed views in systems thinking (such as proposed by Checkland), as social and individual constructions of a context for intervention (i.e. 'what is'). The recognition of the potential limitations of these views is addressed in part through the use of multiple perspectives for taking a systems view and for systems practice. Yet we accept the impossibility of a comprehensive understanding of reality. While we may never know

ontological reality, systems thinking offers approaches for the systems practitioner that can encompass ontological frameworks, such as critical realism, for the sense making and hypothesising of 'what is'.

1.1.4 Challenges for systems thinking and systems practice

The discussion of the challenges for systems thinking and practice presented here includes the limitations of systems thinking as an overarching perspective and that it has not been widely adopted by managers.

From within the systems community, it has been argued that contemporary developments in systems thinking address many of the criticisms of early approaches to systems thinking (Miller & Gregory, 2011; Midgley, 2000). In addition, more recent developments such as multimethodology allow for the integration of systems approaches. These approaches co-exist with tensions between them. For example, the view presented by Ulrich (1994) that mainstream systems literature often ignores the limitations of methodological applications of systems ideas for securing "comprehensively rational problem solutions" (Ulrich, 1994) sets methodological systems approaches against discursive approaches. As noted earlier, the question of what constitutes a body of knowledge for systems scientists continues to be a matter for debate within the systems community.

Notable critique of systems thinking has come from complexity theorists (in particular, Stacey, Griffin & Shaw, 2000) who challenge the view that responses from within the systems thinking community can address what they identify as limitations of systems thinking. While Stacey, Griffin and Shaw (2000) acknowledge the contribution of systems thinking for understanding the "complexity of real human action" (p.82), they argue that the notion of organisations as systems, "reifies and objectifies human action and subjects it to necessary laws or systemic rules" (Stacey, et al., 2000, p.58). In addition, they argue that systems thinking cannot deal with novelty. These criticisms have seen a response from Jackson (2003) and Midgley (2003), amongst others.

Ackoff (2006) suggests two reasons why few organisations adopt systems thinking. These include what Ackoff calls the general reason, i.e. failure by organisations to adopt new ideas, and his specific reason, which is the lack of knowledge or understanding of systems thinking by managers due to the inaccessibility of publications in the field. Ackoff argues that academic publications do not address the needs of potential users.

Section summary and discussion

The discussion in this section has implications for the design of this research study and for the design of management development programmes that include systems theory. With respect to this study, exploring systems practice as a component of systems theory would require consideration of factors

which have the potential to affect the implementation of systems ideas. This has impacted upon research decisions, such as the design of data collection and analysis processes which are discussed in detail in later chapters. Management development programmes that aim to improve or develop the ability for systems thinking and practice of managers would need to provide opportunities for students to apply systems thinking. These opportunities need to be embedded in assumptions of what constitutes effective design and implementation of interventions. The implication is that understanding the epistemological and ontological assumptions that inform choices also informs the development of effective practice.

The epistemological and ontological assumptions informing the different systems traditions presented in this section illustrate that systems thinking could be seen as multiple constructs rather than as a single theoretical construct.

Application to real-world problem situations is an important part of systems thinking. A number of systems methodologies, as well as possibilities for combinations of methodologies and methods are available for interventions. This concept of plurality of methods was discussed. A discursive approach to systems practice, as advocated by Ulrich (2003), is included in this discussion.

In the section that follows the background to this research study is described to motivate the investigation of the broader concerns raised here.

1.2 Introduction to the research context

The purpose of this section is to provide a description of the research context prior to and during the period of the study in order to contextualise the data and the findings.

In the late 1980s an interdisciplinary management programme was established in an engineering faculty at a South African University. The programme had initially been conceived as a postgraduate management programme for engineers as an alternative to a Masters in Business Administration (MBA). At the time, many of the engineering graduates attracted to MBA programmes were perceived to be lost to the profession as a consequence of pursuing other careers after graduating with an MBA (Course Convener, personal communication, 2002). The programme started with an Industrial and Operations Management focus. This evolved to incorporate systems thinking as new members of faculty joined the unit and contributed to the programme. This was seen by the programme designers at the time as aligning the programme with the thinking in Operations Research (OR) of moving into a Systems Age, as distinct from the Machine Age (see Ackoff, 1971, 1979 and Checkland, 1981). The Machine Age was characterised by analysis, reductionism and determinism, in contrast to the Systems Age which focuses on incorporating systems thinking, emergence and teleology (Ackoff, 1979). More simply, the change reflected a conscious attempt to follow in the

footsteps of Checkland (1970) by moving from what was known as hard engineering systems approaches to incorporate soft, interpretative systems approaches. These changes to the programme offering included the introduction of new courses, Kolb's (1984) experiential learning cycle as a learning model and pedagogical activities which encouraged student interaction and participation. Recruitment for the programme was expanded beyond engineers working in management to include those trained in other disciplines. The majority of students worked full time while attending the course as part time students.

By the year 2002, the course convener and lecturers on the course considered the programme to be appropriately designed to support academic success and improve management practice through the use of systems thinking. There were, however, concerns expressed by the convener, and examiners, regarding the attrition rate of students and what they were seeing in course assignments as mechanistic or superficial application of systems methodologies.

In 2003, in-depth exit interviews (summarised in appendix B6) were conducted with a cohort of students with whom there was an unusually high attrition rate (eight students from a total of 22 exited from the programme over a period of seven months). These interviews were intended to explore whether reasons for the attrition were related to academic difficulties or whether there were other reasons not specifically related to the programme. In this inquiry a range of reasons were cited for the early exit from the programme. These reasons were:

- Work and family commitments;
- Inability to cope with the workload;
- Lack of organisational support (participants were working full time);
- Perceived lack of synergy with job requirements at the time;
- Work pressure;
- Job relocation; and
- Academic difficulties.

As part of an action learning process conducted by the programme convener, the findings from the interviews informed changes to the programme. This included changes to specific courses; the briefing of contract teachers; the duration of modules; and the design and management of assignments. The primary intention of these changes was 1) to retain students through providing support and facilitating diagnosis of problems before final assignments were due and 2) to address concerns related to the complexity of thinking and efficacy of application.

While the attrition rate of the programme was reduced in the subsequent cohort, a number of other factors had changed. These were:

- The number of tenured academic staff contributing to the programme had decreased;
- The number of contract staff who were primarily practitioners had increased;
- The head of the unit – who had previously attracted students through consulting work and his reputation in systems theory and practice – moved to another faculty;
- Enquiries by applicants for places on the programme (which required a letter of motivation) indicated that they were attracted to the management practice component and to the qualification and that fewer had prior knowledge of systems theory than had previously been the case; and
- Class sizes were smaller.

With the introduction of these variables, a clear relationship between the programme revisions and student retention could not be established. In addition, the exit interview inquiry had not clearly established the nature of the academic difficulties students were experiencing.

At the time of this study, the course was conceived as creating an environment for participants to learn systemic management practice. The role of systems thinking in this process is similar to that as stated by Strümpfer and Ryan who saw the intention of their course as aiming to "increase the effectiveness and efficiency of participants in general problem solving though increasing their level and use of systems thinking" (Strümpfer & Ryan, 1994, p.87).This focus on systems thinking was based on the assumption that effective management is about the capacity to learn and demonstrate learning through appropriate action in real-world environments. The approach to systems thinking was that it was considered to provide "scaffolding" for this learning by providing a language, tools and techniques for understanding and intervening in the world, in contrast to a Systems Theory course focused on teaching and learning systems concepts and methodologies as the primary objective of the course, i.e. systems thinking was seen as the means to an end rather than an end in itself. The overall objective of the course was stated as enabling students to demonstrate systemic management practice (SMP) which included 1) the ability to view problems of management systemically and 2) the application of appropriate systemic resolutions to these problems.

During this period, course designers acknowledged several concerns with regard to facilitating student learning of systemic management practice (Former course convener, personal communication, 2006). These included:

- The perception of facilitators of an adherence by students to habitual approaches in classroom activities e.g. a focus on task completion as opposed to a focus on process and learning;

- Feedback from students that the completion of assignments was an indication of learning while facilitators sought engagement which indicated transformative thinking;

- Mechanistic or superficial application of systems concepts and methodologies in workplace assignments;

- Despite student reports of the development of their thinking and awareness, course facilitators had some doubts as to the extent to which students had developed their ability for systemic management practice as perceived from the quality of the application of systems ideas in work environments as demonstrated in assignments.

Based on the selection process and the intention of the design and delivery of learning events, students were considered to have the ability to succeed. Where then did the problem lie? Were the students possibly not experiencing and engaging with learning events in the way intended by the curriculum designers?

1.3 Goals for the research and emerging questions

It is the intention of this study to understand how and why learning events have the range of consequences described in the previous section. These consequences indicated that the design and delivery of learning events in this context might be limited in its ability to achieve learning of systemic management practice with all students.

In this thesis grounded theory is the primary methodological approach used to investigate these issues. The motivation for this choice is provided in chapter 2.

Drawing on the issues raised and with methodological considerations in mind, the central research question was formulated as follows:

1. How do students experience learning events designed to develop systemic management practice?

The sub questions were:

2. What are the mechanisms that impact upon learning systemic management practice in this context?

3. What are the implications for pedagogical practice, i.e. designing and managing events for learning systemic management practice?

The answers to the first question, as analysed and synthesised from student interviews, should clarify what motivates the learning of systemic management practice while providing an account of the less favourable consequences. Answers to the second question are intended to explain possible generative mechanisms that could influence experience. In combination, these answers should inform the response to the final question. These three questions then fulfil the purpose of this thesis to 1) understand the relationship between students and learning events in the context of systemic management practice and 2) contribute recommendations for the design and management of learning events for systemic management practice.

1.4 Outline of the thesis

The eight chapters which make up the thesis are structured in deference to grounded theory convention and are briefly outlined in the following paragraphs:

The introduction, *Chapter 1,* of which this is a part, includes a general description of the research problem. The background to the study is described, the overall research objective is presented and the thesis's research questions guiding the inquiry are stated. The theoretical and practical relevance of the research problem is considered.

Chapter 2 (Research methodology) presents an argument for a qualitative approach to addressing the research questions. This argument is supported by a discussion of the ontological and epistemological assumptions which inform the research study. Critical realism is justified as an ontological position which has explanatory power to account for a reality consisting of real entities independent of our experience, while acknowledging that knowledge of the world is fallible. The epistemological pluralism of critical realism paves the way for constructivism as an epistemological position. This position is included to explain how we have knowledge of the aspects of the world we can know. The methodological appropriateness of grounded theory is outlined, with grounded theory discussed as the principal methodological approach to data analysis. Ethical considerations conclude the chapter.

Chapter 3 (Context of research study and application of research methods) provides a description of the course in which the research study took place. The assumptions informing the course design are presented and examples of learning activities are provided. The chapter serves to document the processes of data collection and analysis as conducted by the researcher in this context. Three cohorts of students were interviewed. These interviews were primarily conducted using the Repertory Grid Technique (RGT) in a conversational style. The interviews were recorded and the transcripts subjected to qualitative analysis using grounded theory principles. Repertory Grids were generated

and were used as supplementary to the qualitative analysis with attention paid to maintaining paradigm and methodological coherence in the mixing of methods. Criteria for evaluating the quality of the methodological design, described as trustworthiness, are engaged with.

Chapter 4 (Findings: Learning events as contributors to change) expresses the narrative of the findings as phenomena which tell the story as a consequence of applying the processes of analysis. The first four phenomena presented in this chapter explain the construal of learning events as an evolving process of learning where each phenomenon defines a phase of the process. The chapter includes discussions where each phenomenon is conceptualised, illustrated with excerpts from data, and linked to the relevant fields of literature directed by the analysis.

Chapter 5 (*Findings: Interpretive factors precipitating change*) includes the interpretive contextual and personal elements as five phenomena interpreted by students as influencing how they manage or respond in the learning process. Each phenomenon is discussed and illustrated with excerpts from data, with links to the relevant fields of literature directed by the analysis.

Chapter 6 (Literature review) addresses key areas in adult learning as guided by the grounded theory and presents other studies related to the learning of systems thinking.

Chapter 7 (A grounded theory of the learning of systems thinking) presents the findings as a model, integrating the evolving phases of construal of learning events with the interpretive factors precipitating change. A limited discussion of mechanisms which have the potential to constrain or enhance learning is presented. Based on the discussion of these findings, recommendations are considered for pedagogical practice.

Chapter 8 (*Conclusion and recommendations*) considers the scholarly contributions of the research study and makes recommendations for future research. Some implications of the theory developed for research and for pedagogy are engaged with.

The appendices include copies or examples of all the research instruments, as well as samples of data and analysis of the data gathered in this study. Summaries of supplementary literature are also included.

Conclusion

In outlining the background to this thesis, this chapter focuses on illuminating the main purpose of understanding how students learn systems thinking so as to inform the design of learning events to enhance management practice. Enhanced management practice has the potential to contribute to economic growth and prosperity. While these areas will be expanded upon in the ensuing chapters, this chapter serves to motivate and locate the study conceptually.

The chapter as a review of scholarly literature does not follow the introductory chapter in grounded theory convention. While literature serves a purpose of introducing perspectives on the topic (for example, in this chapter) and to support the justification for the study, a detailed review appears as part of and after the findings, with the intention to link the concepts and properties of the substantive empirical theory developed to existing theory in the field. This approach is consistent with the use of grounded theory as a methodology, as advocated by Strauss and Corbin (1990).

The chapter that follows describes the methodological design informed by the articulated philosophical principles used in this thesis.

Chapter 2: Research methodology

The way we think the world is (ontology) influences: what we think can be known about it (epistemology); how we think it can be investigated (methodology and research techniques); the kinds of theories we think can be constructed about it; and the political and policy stances we are prepared to take.

(Fleetwood, 2005, p.197)

What society is held to be ... affects how it is studied.

(Archer, 1995, p.2).

Introduction

The previous chapter introduced the research context to frame the research concerns and questions. The purpose of this chapter is to provide a justification for the choices of methodologies used to address the questions raised in Chapter 1. These questions were distilled from the concerns regarding student experience of the course. As these represent phenomena which are not available for understanding through direct observation, the core question sought access to the perspectives of the students of their experiences of learning. Gaining access to perspectives and experiences as data from which to develop knowledge necessitates the understanding that such data is loaded with meaning and interpretation. As Usher (1993) notes, "the key feature of experience is that it has meaning, thus the meaning of experience depends on an interpretive process" (p.170). Based on this, a qualitative methodology may seem an obvious choice. Guba and Lincoln (1998) caution against making methodological selections before we have answered more fundamental questions related to paradigm, which they define as the "basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways" (p.195).

Therefore to support the motivation for the appropriateness of the methodologies described for addressing the questions, a discussion of the ontological and epistemological assumptions informing this study is presented in the first section of this chapter. Grounded theory is discussed as a methodology coherent with these philosophical assumptions in the second section. In the final section of this chapter the issues of trustworthiness and ethics in qualitative research are examined.

2.1 Ontological position

In research in education, ontology has tended to be subordinated to epistemological concerns (Dall' Alba & Barnacle, 2007). In this thesis specific reference is made to ontology, as *learning* is considered not as a construct which exists as a social reality, but as a human endeavour, the meaning of which has significance accrued by definitions of frameworks of social reality and knowledge. The

extremes of ontological assumptions about the social world can be represented by a *nominalist* view i.e. that objects of thought are merely words or that social reality is a product of individual consciousness; and the *realist* view that objects have an existence independent of a knower (Cohen, Manion & Morrison, 2000). Sayer (2000) describes empirical realism as treatment of the world as consisting of observable objects, events and interactions among them as if they have no unobservable qualities, structures or powers. While both these views prevail in research on student learning, there is a growing preference for theoretical frameworks and methodologies which favour a socially constructed ontology i.e. nominalism. These views in their extreme forms are rejected for this study; instead the ontology of critical realism was explored and applied as it presents an ontological position which offers ways of conceptualising a complex educational reality (Jörg, Davis & Nickmans, 2007) which considers not only the empirical but the underlying structures of experience. Although some aspects of critical realism were mentioned in the previous chapter in relation to systems philosophy, the discussion presented here is intended to inform the argument for selecting critical realism as the ontological perspective for this study. There are different versions of critical realism available (Elder-Vass, 2007), the version which is drawn on in this section is aligned with Bhaskar's basic critical realism.

Following Sayer (2000), I will outline key features of critical realism relevant to this study including discussion of the concepts of *stratification* of reality, *intransivity*, *emergence* and *causation.* This is followed by consideration of the relationship between the person and society or *agency* and *structure.* This discussion is followed by a brief comment on Bhaskar's conception of discovery (Bhaskar, 1989; Corson, 1991).

2.1.1 Stratification of reality and intransivity

The notion of ontological depth is central to critical realism. This means that what we observe as events in the world is ascribed to mechanisms, which are derived from structures of objects, that are located in geo-historical contexts (Sayer, 2000). In describing the value of this contribution of critical realism for orientating the researcher, Sharp (1998) notes the distinction critical realism makes between "the empirical (the level of experiences); the actual (the level of events) and the real (the level of structures and causal powers)" (Sharp, 1998, p.12). Bhaskar (1978) uses the term *ontological stratification* to describe these three domains of reality. These domains, which make up the whole of reality, as described by Bhaskar (1978, 1998) constitute the *real* domain (which is *intransitive* i.e. consisting of structures mechanisms existing independently of our descriptions of them); the *real* domain generates events, these events may or may not be experienced directly i.e. in the domain of *actual* events there could be events which exist whether or not they are observed or experienced; those events which are observed or experienced constitute the *empirical* domain. These domains are illustrated in Table 2.1.

Table 2.1 Bhaskar's three domains (Bhaskar, 1975, p. 56)

	Domain of real	Domain of actual	Domain of empirical
Mechanisms	X		
Events	X	X	
Experiences	X	X	X

Although these domains are considered to be valid for both the social and natural world, social structures are recognised as having different properties from physical structures (Mingers, 1999). Archer (1998) acknowledges this in stating that "critical realism accepts the challenge of ontological difference between physical and social reality" (p.190). Continuing this point, Outhwaite (1998) explains that defining intransitive elements in a social space is problematic. He illustrates this simply, with reference to people accepting assertions about the structure of DNA, but viewing sceptically or debating any assertions made about the "social structure of modern Britain" (p.285). Outhwaite (1998) notes that this scepticism is well placed and exists not because of the lack of measurable quantities in the social space but that some things are more elusive to explanation than they are meaningful to those seeking to explain them.

2.1.2 Emergence and causation

In addition to the concepts of *stratification* and *intransivity*, *emergence* is a characteristic of a critical realist world. Emergence attests to the unpredictability of reality by acknowledging that new phenomena emerge from interactions of two or more components, "which have properties which are irreducible to those of their constituents, even though the latter are necessary for their existence" (Sayer, 2000, p.12). These emergent realities impact on other levels or domains with each level produced by but not reducible to, the mechanisms in the more basic strata grounding it (Harvey, 2002). The principle of emergence is also central to systems thinking. Explanations for behaviour in human activity systems (Checkland, 1981) can similarly be accounted for as emergence, where the system exhibits properties "which derive from interactions of its component activities and their structure but cannot be reduced to them" (Checkland, 1981, p. 314).

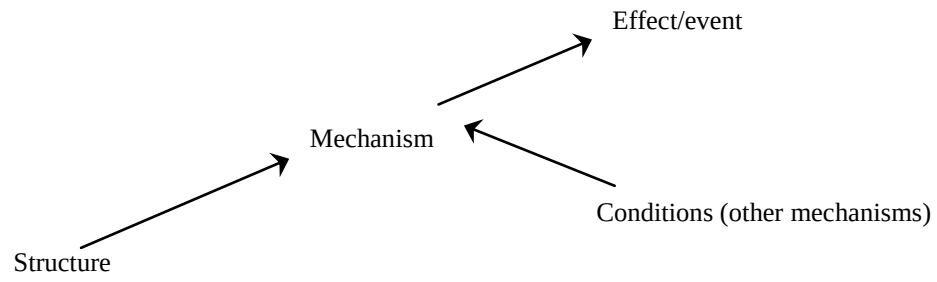


Figure 2.1 Critical realist view of causation (Sayer, 2000, p.15)

Figure 2.1 illustrates the concept of causation in critical realism where the *intransitive* structure, defined by Sayer as "a set of internally related elements whose causal powers, when combined, are emergent from those of their constituents" (2000, p.14) gives rise to generative mechanisms which are manifested as events. These events therefore emerge from the workings of the mechanisms and may or may not be observed. It is important to distinguish the concept of *causation* in critical realist terms from the use of the term causality in other research paradigms which view causal explanations as explanations of the regularity of events for the purpose of establishing general laws and principles. Sayer (2000), with a critical realist voice, expresses caution with respect to research approaches which look for patterns as repeated occurrences in order to make claims about causation. He says boldly that "what causes something to happen has nothing to do with the number of times we have observed it happening" (Sayer, 2000, p.14). The same mechanism could produce different effects or events in a different context, in addition, a cause could have a different historical time frame to the outcome. For example, students learning identities are sedimented over a period of time and have political, cultural and cognitive dimensions. These identities could be enacted in response to a particular learning event which may take place much later, in a different geographical space than the identity formation.

2.1.3 The person/society connection and change

Archer describes a separation of the intransitive components of society such as social structures and culture from the activities of people or "agential doings" (Archer, 1998, p.199). This separation of society from its members is clarified by Bhaskar (1989, p.35), who argues that it is important to distinguish categorically between people and societies, "because the properties possessed by social forms may be very different from those possessed by the individuals on whose activity they depend." Sharp (1998) also draws attention to the causal powers of both social structures and human agency, calling for researchers to explore their interactions and noting that any explanation which attends to either one exclusively is likely to be inadequate. Archer (1995) describes the relationships between structure and agency in much detail in her social theory, which is based on the philosophy of critical realism, noting that, "the reality experienced by the collectivity is not reducible to the personal

reactions of its members; nor is the subjectivity of the latter understandable without reference to the objectivity of the former" (Archer, 1995, p.120).

The concepts of social structure and agency are contested. Elder-Vass (2010) presents what he calls "a solution to the problem of structure and agency" (p.1) and in so doing, crafts an argument where social structure is explained as "the causal powers of specific social groups" (p. 86) and individual agency as "the specific powers of human individuals" (p. 88).

Corson (1991) describes what he describes as an insistence of Bhaskar's critical realism that, "we will only be able to understand and change the social world if we identify the structures at work (i.e. the reality of the mechanisms themselves)" (p.231). Corson (1997) proposes that conducting research using a critical realist framework requires an adequate interpretation of the structural influences in people's lives; he suggests that doing so involves discovering what is on people's minds through what they report as reality for themselves, and then trying to confirm the reality of the things they report. This is to be followed by explanations of structural influences. Bhaskar (1979) argues that discovering these structural influences offers the opportunity for emancipation, as the mechanisms causing problems can be removed or replaced by more desirable mechanisms. This needs to be read in the context of the *intransitive* nature of structure in a social context. Although people can take the role of agents of change, structures have built up over an extended period of time and are often resistant to change. Researchers therefore must exercise caution when proposing change (Sayer, 2000).

Of what significance is this ontological perspective to educational researchers and to this study in particular? Corson (1991) describes education as an open system. In Bhaskar's (1979) description of open systems, the absence of "invariant empirical regularities" (p.57) means that our knowledge of structural influences in these open systems is limited and non-predictive, as the generated effects in the empirical domain operate as tendencies or influences in a context; they do not determine events (Sayer, 1992). It does however, in Corson's view, provide understanding of the "real past and the present" (1991, p.238). The analytical distinction between agency and structure allowed by critical realism provides a framework for theorising the interplay between structure and agents in the learning context. This distinction affords opportunities for accounts of the constraints and possibilities of individual or group capabilities as well as structural constraints.

Corson (1991) draws on aspects of Bhaskar's theorising to present a detailed motivation for the use of critical realism in developing knowledge in all aspects of education. While this discussion will not be repeated here, the notion of Bhaskar's "conception of discovery" presented by Corson for providing strong accounts for the reality of educational contexts, is explored in the section that follows.

2.1.4 Bhaskar's conception of discovery

Bhaskar raises the question of how knowledge comes to be produced, and how in particular, "law-like statements come to be established as necessary" (1998, p.48). Corson (1991), drawing on Bhaskar's earlier works, provides a succinct summary of Bhaskar's response to this question, which takes the form of a retroductive methodology for hypothesising generative mechanisms. Following Corson's example (1991, p. 237), each stage is illustrated with an example in square brackets [ ].

1. *An effect (result or regularity) is identified and described* [e.g. certain people are more successful in knowledge development in management development courses than others].

2. *A creative model of the 'mechanism' involved is postulated as a solution or explanation or response to the problem, which, if it were to exist, would explain the effect* [a plausible theory is postulated such as interplay between individual cognitive and social identity based on cultural and social structures that impacts on how knowledge is perceived and produced].

3. *Research of two kinds is undertaken to demonstrate the existence and operation of the mechanism, the first kind, to isolate and in some instances observe the mechanism in action (i.e. show the reality of the reasons or accounts involved)* [research into how and what people learn and how individual and social elements impact on this]. *The second kind is undertaken to eliminate alternative plausible hypotheses* [research could be undertaken to consider possible plausible alternatives to explain success in knowledge development, such as the extent to which the power of facilitators/teachers derived from their role and function in an educational context inhibits knowledge development by promoting knowledge reproduction in students].

4. *The postulated mechanism, once shown to be real, becomes available as evidence for interpreting the world (as it is or has recently been), action to replace unwanted with wanted forms of determination provides the critical concluding phase in this emancipatory process of discovery* [action to promote reflexivity by individuals and groups of students through frameworks which could include ontological and epistemological analysis to reduce the influence of negative impact of social identity and to seek access to resources for cognitive support].

In seeking to identify underlying causal mechanisms rather than settling for descriptions of what we can see and experience, educational researchers should consider the potential fallibility of explanations and predictions. Critical realism therefore alerts us to the restrictions on our understanding and possible analysis if we do not consider the individual person with her layered reality in a layered social environment. In support of this view, Clegg (2005) argues that any

explanations of outcomes from educational interventions are "interested in structures, powers, generative mechanisms and tendencies, which are all ways of scientifically conceptualising the underlying processes that produce the empirical" (p.420-421). Experimental designs, she says, if they are not trivial, have complex inputs and outcomes (Clegg, 2005).

To conclude this section, critical realism is a dynamic philosophical tradition which Bhaskar describes as an 'underlabourer' for both the natural and social sciences. As it is an extensive tradition representing an ongoing evolution by Bhaskar of his own work, and the work of a number of other contributors who have expanded on Bhaskar's ideas, the descriptions and explanations provided in this thesis represent a selection of what is available to the researcher. This selection, which focuses on Bhaskar's first wave of critical realism, was informed by the explanatory power afforded by: 1) the conception of reality as stratified, allowing for theorising of experience beyond positivist and constructivist approaches and both ontological and epistemological explanations; 2) acknowledgement of underlying generative mechanisms, causal relationships and emergence, which is complementary to systems thinking and practice; 3) consideration of the analytical distinction and interdependence of agency and structure.

2.2 Epistemological considerations

In considering judgments about what can be known about reality, for the purpose of establishing an epistemological position coherent with critical realism, Bhaskar (1978) provides direction with his assertion that social phenomena exist independently of people's representation of them but are only accessible through these representations, i.e. socially mediated. Sayer (2000) quotes Bhaskar (1986, p.72) in the statement that "critical realism accepts 'epistemic relativism', that is the view that the world can only be known in available descriptions or discourses, but it rejects 'judgemental relativism'- the view that one cannot judge between different discourses and decide that some accounts are better than others". Knowledge, according to Bhaskar (2002), is transitive, social, geo-historical, emergent and concerned with understanding the stratification of the world. This historical transiency and acknowledgement of the influence of time, place and the position of the knower in determining meaningfulness and value of knowledge, is presented by Al-Amoudi and Willmott (2011) as informing the argument for epistemological relativism in critical realism. Al-Amoudi and Willmott (2011) draw on their communication with Sayer to distinguish between 'epistemic relativism' and 'epistemological relativism'. Sayer describes epistemological relativism as "philosophical theories of knowledge that mediate our understanding", whereas epistemic relativism implies "existing knowledge or discourse does the mediating" (Al-Amoudi & Willmott, 2011, p.42). In either case these can be read to represent an epistemological position that considers knowledge as a construction of reality that is ascribed meaningfulness from the discourses through which they are articulated.

A constructivist epistemological position is therefore not incommensurate with critical realism. Sayer (1992) agrees with Maxwell and Mittapalli (2010) who advocate that *meaning* is important in critical realism, with "mental entities as equally real as physical ones" (Maxwell & Mittapalli, 2010, p.156). Although the notion of multiple incommensurate realities does not have currency in critical realism, the concept of different valid *perspectives* of a reality independent of our knowledge of it, does. Constructivism is therefore viewed in the context of meaning or perspective formation in a stratified realist reality. It presents a theoretical view of how perspectives are formed and explains how these perspectives can be accessed.

2.2.1 Knowledge as personal construction

George Kelly (1955) viewed human beings as agents or "person-as-scientist" and places phenomenological emphasis on how people make sense of their experience. Personal knowledge can originate from a range of experiences which are part of living life, including both practical experiences, such as everyday activities, as well as formal schooling. The development of this knowledge has been seen as an active process of trying out the viability of hunches, tinkering and experimenting with new ideas, refining old ideas, challenging opinions, problem setting and problem solving (Salmon, 2003). In Personal Construct Theory, our experiences can be modelled as a system of constructions which we use to anticipate new experiences. We use these constructions to interpret and give meaning to our experiences.

2.3 Research methodology

The use of an integrative combination of elements from different methodological paradigms to address research questions is supported by a number of authors who have considered issues of research design within a critical realist framework (see Mingers, 2000a; Sharp, 1998; Ackroyd, 2004). Sayer (2000) makes the point that critical realism is compatible with a range of different methods allowing the researcher to be guided by the nature of what is to be studied and what the researcher wants to know about it. Yeung (1997) specifically mentions grounded theory as a methodology compatible with critical realism. Others, such as Oliver (2011), note that contemporary approaches to grounded theory contextualise behaviour and action within broader social structures and meanings. This, Oliver (2011) argues, contributes to its compatibility with critical realist tenets.

Grounded theory is suitable for studies of situated processes and those "concerned with issues associated with individual and group behaviour" (Locke, 2001, p. 95). Although grounded theory is often used to support theorizing of "new substantive areas" (Locke, 2001, p.96), the use of grounded theory for bringing new perspectives and new theorizing to areas can, according to Locke, enliven and modify existing theoretical frameworks. This can be illustrated with studies of learning. Although it is an area of research that has a rich array of theoretical frameworks, learning is one of the areas that

Glaser (1999) credits with making a contribution to the spread of grounded theory. Glaser (1999) accounts for this with his view that grounded theory provides answers to variation found in disciplines that have to deal with "important, highly relevant dependent variables" (1999, p. 839).

In the study of interest in this thesis, the course design was theoretically informed and is concerned with issues related to the quality of learning and development. When viewed from different perspectives, for example, are certain students more capable of learning systems thinking than others? Or, perhaps the teaching styles facilitators use in the classroom may privilege some students over others? It became clear that there was not one clear outcome to test as theory; it was therefore difficult to formulate a clear hypothesis. As a methodology that does not require a priori hypothesis and privileges emergent theory over preconceived theory (Locke, 2001) grounded theory provides the means to represent the student experience in the context of the course. In addition, the suitability of grounded theory for studying situated processes contributes to explanations that could inform practice. Grounded theory was therefore selected as the methodological choice for this study.

2.3.1 Grounded theory

Strauss and Corbin described grounded theory as a "general methodology for developing theory that is grounded in data systematically gathered and analysed" (1994, p.273).The emphasis in grounded theory is on generating theory that is faithful to the evidence and provides systematic techniques for data collection and analysis intended to achieve this. Although the philosophical tradition of pragmatism and sociology's symbolic interactionism helped inform grounded theory, this does not exclude it, as a methodology, from use in other paradigms. The empirical emphasis of symbolic interactionism privileges the meanings people make of objects in the world, e.g. "researchers must enter the social worlds of the people they study in order to understand the situation from the subject's point of view and to observe firsthand what the subject finds meaningful and how she makes meaning" Locke (2001, p.24). What is conceived of as reality in symbolic interactionism is therefore not clearly distinguishable from peoples' perceptions of their reality. In section 2.5.2, the argument is presented that the empirical emphasis associated with grounded theory as a methodology is not incommensurate with a critical realist ontology.

While grounded theory is not expected to be rigid and prescriptive (Gurd, 2008) there are central tenets to the methodology which distinguish it from other methodologies. Corbin and Strauss propose 11 canons of grounded theory method (Corbin & Strauss, 1990). Gurd (2008) arrived at four key canons after reviewing a number of authors, these he claims are uncontested in the variety of texts that were reviewed.

As all these canons are appropriate in the present study, each of these is described below:

The iterative process of data collection and analysis

Glaser and Strauss's (1967) seminal work on grounded theory method refers to the iterative analysis of data as data is collected. The intention is not for researchers to collect the full sum of data and analyse thereafter, rather, in a process of discovering theory, "all three procedures (data collection, coding and analysis) go on simultaneously to the fullest extent possible" (Glaser & Strauss, 1967, p.71).

The constant comparative method

Locke (2001) describes the constant comparison method as a process which spans the entire study, "moving from assigning meaning to incidents of recorded data to refining and writing up the completed theoretical framework" (p.45). Glaser (2002a) says that constant comparison weaves together the rigorous steps of the grounded theory process and is designed to generate concepts. The comparison of similarities and differences of incidents and categories is a process of assigning meaning and refining the theory from the data.

Theoretical sampling

In developing a theory about a substantive topic, the intention with grounded theory is to encompass variety by engaging in the practice of searching and sampling data throughout the study to provide the best possible information. While the research design may set constraints in terms of context boundaries and respondents sampled, these selections need to be made according to their theoretical relevance for theory development and incorporate different types of data.

Explanation of coding and the theory building process

Gurd (2008) argues for grounded theory researchers to make their approach to coding and theory development explicit. The ability to articulate the grounded theory in a credible fashion is a concern shared more generally by qualitative researchers as the theory needs to be acceptable to those who read it. Glaser and Strauss suggest writing practices to bring readers into the research setting, including inclusion of "direct quotes by informants, descriptions of the scene, and excerpts from field-note renditions of observed interactions" (Locke, 2001, p.60).

2.3.2 Consideration of risks in grounded theory

Suddaby (2006) provides a concise account of the common misconceptions about grounded theory. The first of these misconceptions is arguably the most common, namely, for the researcher to enter the field without prior knowledge or experience. An unbiased researcher, untainted by the literature review and consequent hypothesis or research question which characterises positivist approaches to research, is what characterises this misconception. Researchers taking this route may hope to develop new knowledge and insights into well researched areas such as adult learning, but runs the risk instead

of producing a "mass of descriptive material waiting for a theory, or a fire" (Coase, 1984, p.230). The risk that the researcher should caution against is using literature to derive hypotheses, either overtly or tacitly, for testing in the grounded theory process (Suddaby, 2006). Suddaby (2006) proposes that one way to avoid this is to draw literature from more than one substantive area. In this thesis, substantive literature was drawn from a number of learning theories and systems theory; in addition, an effort was made to be mindful of imposing categories or concepts emerging from the literature onto the data, focussing instead on discovering concepts and relationships through the process of analysis.

Producing trivial or trite theories, for example, adult learning results in personal development, is a real risk in grounded theory. This could be a consequence of incomplete analysis or data which is "relatively undigested" (Suddaby, 2006, p.635; Goulding, 2002). Incomplete or inappropriate analysis can result from premature closure, not having enough data or not interrogating the data sufficiently. In addition, inappropriate analysis can be as a consequence of not making clear distinctions between grounded theory and similar methods or methodologies such as phenomenology and content analysis. Although there are commonalities between grounded theory and phenomenology, phenomenology privileges subjective experiences of individual participants and seeks to report these stories with the participants as the unit of analysis. By contrast, although grounded theory may require in-depth interviews to elicit subjective views, these individual stories are not the prime objective of the research process; instead "they are the means of eliciting information on the social situation under examination" (Suddaby, 2006, p.635). Avoiding methodological transgressions requires that the process adheres to the key canons of grounded theory, as outlined in section 2.3.1 above, and that the distinctions between grounded theory and other methods are demonstrated through descriptions of the processes of data collection, analysis and theory development. In section 2.5.1 and the next chapter of this thesis, these processes are outlined in detail.

The reading and application of more structured approaches to grounded theory (for example, Strauss & Corbin [1990] have been criticised for taking a cookbook approach) can expose a novice grounded theorist to the risk of producing poor theories by encouraging a more formulaic and routine approach rather than the sophisticated interpretation and conceptualisation required. A risk associated with these approaches is that in placing "excessive emphasis on the coding process" (Goulding, 2002, p.159) the theoretical development is orientated towards description instead of discovery. The process of discovery involves interpretation and conceptualisation, which requires crafting and creativity on the part of the researcher. Glaser (1978) describes in human terms what the process is like, with periods of emergence of ideas and concepts alternating with periods of depression and inability to see conceptual relevance. Goulding (2002) suggests that this is a process of several journeys as it is the on-going interaction between the data and the researcher which decides the quality of the resultant grounded theory.

The integration of critical realist ontology with grounded theory presents the potential risk that either the inductive analytical procedures which characterise traditional grounded theory or the retroductive analytical approach of critical realism could be compromised. Oliver (2011) acknowledges a tension between the two approaches and cautions that explanations of generative mechanisms for the phenomena discovered from the grounded analysis requires a shift from pure induction in grounded theory to abduction. Charmaz (2006) supports the use of abductive reasoning in grounded theory, noting that the reasoning process includes making theoretical conjectures and checking them empirically. She describes the abductive reasoning process as: "entails considering all possible theoretical explanations for the data, forming hypotheses for each possible explanation, checking them empirically by examining data and pursuing the most plausible explanation" (Charmaz, 2006, p. 104). In this study, provisional, tentative hypotheses were discovered and replaced as analysis progressed. This approach is supported in grounded theory literature (see Corbin & Strauss, 2008; and Charmaz, 2006). In addition, accounting for generative mechanisms by asking questions such as, "what must be true for this to be the case?"(Oliver, 2011, p. 10) or 'what are the deeper, structural issues which could produce these phenomena?' provided what Oliver (2011) refers to as vertical explanations. In this study, these explanations were sought and used in conjunction with the grounded theory findings.

While all qualitative research can be considered to be time consuming, grounded theory relies on an ongoing process of data collection and analysis for theory emergence and to achieve saturation. In supporting his statement that "grounded theory is not easy" Suddaby (2006) makes reference to the advantage of researchers having "considerable exposure to the empirical context or subject area of research" (p. 639). In the case of the research study on which this thesis is based, an extended period of time, with each of three cohorts of students, was spent in the field. This immersion in the research context provided opportunities for averting many of the risks associated with grounded theory by allowing for iterative cycles of observation and data collection in parallel with analysis and theory development.

2.4 Issues in data collection

In this thesis, students' experiences of learning is studied in a specific context. A data collection strategy is therefore required which facilitates a person's identification of an event or incident of learning and their reflection on their experience at the time. The Repertory Grid technique (RepGrid), based on Kelly's (1955) theory of personal constructs, is a method for exploring personal construct systems. The fundamental postulate of Personal Construct Theory (PCT) is that "a person's processes are psychologically channelized by the ways in which he (sic) anticipates events", the "ways" are the constructs of a repertory grid, and the "events" are the elements (Bell, 2003, p.95). Although the technique has its origins in clinical psychology practice, specifically as a therapeutic technique, a

number of studies have reported use of the technique in business applications and student learning (Stewart, 2008; Fromm, 2003). The Repertory Grid technique offers a structured process for data collection and analysis therefore serving as an activity for learners to develop an awareness of their assumptions in order to analyse them as a process of gaining self-understanding; and provides a structure for conducting interviews. This structured interview process provides data which could be subjected to both quantitative and qualitative analysis. Easterby-Smith, Thorpe, and Holman (1996) consider that, "the aim of a repertory grid is to enable the user to articulate his or her own understanding of the world. The interview itself can be seen as a conversation in which both parties are seeking to explore the interviewee's, not researcher's, understanding" (Easterby-Smith et al., 1996, p.9). Thomas and Harri-Augstein (1985) describe the technique as being "formally structured whilst remaining content-free" (p.18), allowing for individuals to ascribe personal meaning to events.

In what can be considered to be standard applications of the RepGrid, the elements are identified by asking respondents to specify an event bounded in time and context, delineated by the subject choice of the study, for example, "Tell me about an event /incident in the course where you learnt something in relation to your practice". These are called *element elicitation* questions. Constructs are elicited from distinctions made among these elements using randomly selected triads. This is illustrated by Bell (2003, p.97), "the respondent is presented with sets of three elements (triads) and for each set is asked to specify some important way in which two of the elements are alike (the emergent pole of the construct) and thereby different (the contrast pole of the construct) from the third." The result of the process is a bipolar construct, channelling experience along dichotomous dimensions: good versus evil, thinking versus doing and so on (Mezirow, 1991). These may serve as a starting point for a process of laddering which entails the elicitation of superordinate, more value-laden constructs, for example, "good subsumes kind, generous, empathic, brave, intelligent and the like" (Mezirow, 1991, p.52). Using the construct the respondent is asked questions such as, "which of these poles do you prefer?" and "why is this important for you?" The nature of the constructs and the elements identified also serve as qualitative data. The technique is often taken further by relating elements to constructs through a process of rating (on a 1 to 5 scale) the elements against the 'range of convenience' of the construct i.e. 1 would represent one construct while 5 would represent the opposite pole. This may be interpreted as quantitative data and represented in the form of a grid. The grid is a completed matrix with element labels at the top of each column, construct labels on the side of each row and ratings which are represented as numbers showing the relationship of each element to each construct (Fransella, 2003). An example is provided in Chapter 3.

Benefits and limitations of the RepGrid as a data collection technique

The virtues of the repertory grid as an interview technique have been noted by a number of researchers, with the flexibility of the grid offered as one of its most favourable features (Neimeyer,

2002). Bell (2003) also highlights the flexibility as a positive feature noting that it can be used to provide many different kinds of information and allows for both individualized and normative assessment. Neimeyer (2002) cautions the researcher in relation to the flexibility of the technique, with the acknowledgement that changes in procedure affect the outcomes. Different phrasing of words used to describe constructs and elements can, for example, have very different outcomes, therefore the researcher has "the responsibility to identify the effects of particular procedural variations, to articulate conceptually grounded understandings of these effects, and to test the impact and implications of these changes on the measures of meaning derived from the method" (Neimeyer, 2002 p.92). The responsibility of the researcher in ensuring the coherence and quality of an interview is echoed in Kvale's (1996) reference to an ideal interview. As part of his broader discussion of quality criteria for qualitative research interviews, in an ideal interview "...the meaning of what is said is interpreted, verified and communicated by the time the tape recorder is turned off." This, he goes on to say, "demands craftsmanship and expertise and presupposes that the interviewer knows what she is interviewing about, as well as why and how." (Kvale, 1996, p.144).

Used mindfully, the advantages of the RepGrid as described by (Stewart & Stewart, 1981) with respect to the quality of data would include:

- It can be applied to gain access to constructs which would otherwise remain hidden;
- It is based on the framework of the individual rather than the interviewer thereby reducing bias;
- And as a process of co-construction it provides insights for both the researcher and the researched (Stewart & Stewart, 1981).

Personal construct theory as a conceptual basis for the technique is also considered an advantage by Bell (2003).

In exploring the trustworthiness of the technique, it offers inherent validity procedures. While this is discussed in more detail in the next chapter, an appropriate application of the RepGrid as a technique for qualitative data collection and analysis satisfies validity criteria of triangulation, member checking, and an audit trail and provides data for a thick description. Each of the other procedures as listed by Creswell and Miller (2000), in the next chapter, can be applied as part of the research process.

2.5 Methods of data analysis

There are a variety of data analysis options when working with the data generated from the conversational repertory grid interview. For example, there are a number of computer programs which

could be used to analyse data from repertory grids. These would generally show statistical relationships of constructs to each other, elements to each other and relationships between elements and constructs. The validity of these relationships as quantitative data should be considered with caution as the relationships are essentially qualitative. There are also a range of ways in which the data could be analysed without the use of the computer, these would include descriptive analysis of grid content, analysing numerical relationships between elements and constructs in single grids and analysing more than one grid by comparing them (Jankowicz, 2004).

When conducting the interview, the conversational style produces qualitative data, particularly in the laddering process where choices are discussed and motivated by the interviewee. This can be recorded and the transcribed data is available for qualitative analysis with the rated constructs informing the coding process.

2.5.1 Data analysis using grounded theory principles

In Grounded Theory, data analysis is meant to occur in parallel with data gathering, with each process informing and guiding the other. This analysis is a process of sense-making of the data in relation to the research questions and concerns. This sense-making occurs as a process of ascribing codes to the verbatim transcriptions and other data. The seminal work of Glaser and Strauss (1967) in grounded theory analysis has been developed further by a number of researchers including the partnership of Strauss and Corbin (1998) and by Glaser (1998). While the initial approach to data analysis in this study was influenced by the work of Glaser, the completed analysis produced drew on a range of resources (including Strauss & Corbin, 1998; Miles & Huberman, 1994; Locke, 2001; Fernández, 2004; and Charmaz, 2003, 2006) that served to influence the actual analysis process. Figure 3.4 in the next chapter illustrates the procedure and the process in developing the grounded theory in this study.

2.5.2 Data analysis and abstraction

Seeking explanations in critical realism beyond the empirical to hypotheses of generative mechanisms or structures that if they existed would explain the observed results (Syed, Mingers & Murray, 2010), has implications for how analysis is conducted. Danermark, Ekström, Jakobsen and Karlsson (2002) propose abstraction as a way of conceptualising that informs realist causal analysis. They describe our knowledge of reality as "conceptually mediated" (Danermark et al., 2002, p.15), noting that "critical realism indicates that the relation between the real-world and the concepts we form of it is the focus of the research process" (1997, p.15). Abstraction should aim at determining those necessary and constitutive properties of different objects, in the process the necessary properties should be separated from the contingent ones in order to discern that object for what it is as separate from something else (Danermark et al., 2002). Within a critical realist framework, abstraction needs to move beyond inductive reasoning to retroductive reasoning. Danermark et al. (2002) describe inductive reasoning as

moving from observations of a limited number of events or phenomena to drawing conclusions from a larger population without leaving the empirical domain, in other words, empirical generalisations. They caution those using grounded theory, saying that the empirical bias in the inductive methods of grounded theory will not contribute to knowledge of fundamental social structures. Although they acknowledge that in Glaser's description of grounded theory he stresses going beyond the empirical to developing theories at higher levels of abstraction (Glaser, 1978 in Danermark, et al., 2002; Glaser, 2002a), they present their claim that the practice of grounded theory "underrates the value of general abstract theorizing" (Danermark, et al., 2002, p.140) as a serious limitation.

Describing theoretical concepts as "scientific instruments necessary to find alternatives to common-sense categories" (2002, p.136), Danermark et al. propose the use of existing theories and concepts in pursuit of attaining knowledge of underlying social structures. Analysis would involve moving beyond empirical induction to retroduction to developing concepts which provide explanations for underlying mechanisms and conditions which give rise to observable phenomena and events.

In this thesis this process of reasoning is conducted for the purpose of providing explanations that could account for underlying social structures and emergent properties that condition the social context for learning and students' actions in relation to their learning. This requires a view of the literature as a source from which to retroduce where generative mechanisms come from which can account for the phenomena discovered through grounded theory analysis. While this is analytically possible to achieve through the process of grounded analysis, retroductive reasoning explicitly goes beyond the empirical.

Therefore, while the emphasis in grounded theory analysis is on the empirical coding process, it does not preclude the hypothetical knowledge of structures achieved through retroduction conducted with critical realist ontological assumptions. The work of Volkoff, Strong and Elmes (2007) is an example of a study that combined grounded theory with critical realism to account for how technology leads to organisational change.

As Hammersley (1993) argues, claims are judged for their credibility and plausibility not by the extent to which researchers are purist about particular methodological approaches.

2.6 Issues of validity

2.6.1 Realist considerations of validity

Maxwell and Mittapalli (2010) propose that validity from a realist perspective is not a matter of procedures but is concerned with the relationship between the claim and the phenomenon to which the claim relates. While they note that we cannot produce an objective perception of the phenomenon, we should expect to test the claims we make about the phenomenon against evidence about the

phenomenon, endeavouring to produce an adequate explanation of the phenomenon. In addition, not only should a realist approach to validity entail a valid description, explanations or interpretations of the phenomenon, which are supported by evidence, but researchers "must address plausible *alternative* descriptions, explanations or interpretations of the phenomenon about which the claim is made" (Maxwell & Mittapalli, 2010, p.159).

2.6.2 Alternatives to internal and external validity

Creswell and Miller (2000) list nine validity procedures, as illustrated in Figure 2.2, which although by themselves cannot guarantee the trustworthiness of a research process, provides a framework for consideration of threats to validity in order to increase the credibility of the findings.

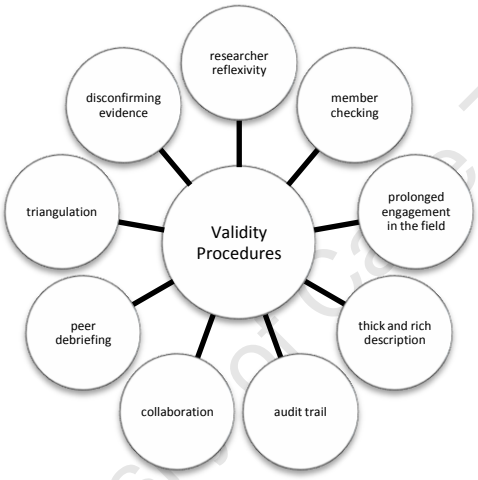


Figure 2.2 Validity procedures (adapted from Creswell & Miller, 2000)

Credibility, as described by Lincoln and Guba (1985) replaces the term 'internal validity' as used in conventional validity procedures. They claim that conventional validity procedures make an ontological assumption of naïve realism which conflicts with the interpretative stance of multiple realities. Not in the sense of multiple realities as a reflection of independent and incommensurable worlds, but as different perspectives on the world. The term credibility is therefore used in this study in place of validity. The standards for trustworthiness or authenticity (Guba & Lincoln, 1989) is required to reflect consensus, and arguably represent the most informed and sophisticated interpretation available. More specifically these relate to both the methods and findings, e.g. triangulation, disconfirming evidence, researcher reflexivity, member checking, prolonged engagement in the field, collaboration, audit trail, thick and rich description, and peer debriefing (Creswell & Miller, 2000).

Transferability replaces the traditional term of external validity although it presents a significant departure with respect to the meaning of the concept as the burden of proof of transferability rests with the person seeking to make the application elsewhere if the findings are context specific. While external validity is not provided by the researcher, the rich, thick description necessary for establishing credibility can assist transferability to another context.

2.6.3 Trustworthiness

Lincoln and Guba (1985) proposed a framework appropriate for naturalistic inquiry in order to address the issues associated with the practice of interpretivism. Greene (1992) highlights that these issues are still the subject of debate, "One judges the success of a journey based on where and how one wanted to go. Yet again, as is true of inquiry criteria, inquiry destinations in interpretivism are ill-defined and problematic" (Greene, 1992, p.43). In this statement Greene alerts us to her concerns with respect to the evaluation of the quality of interpretative inquiry practice years after the publication by Lincoln and Guba.

The nature of naturalistic inquiry (single researcher, context specific, etc) necessitates a clear discussion of the practices engaged with by the researcher to ensure that the results are credible. The earlier argument outlining the paradigm assumptions of this study is what broadly informs the selection of validity procedures, although within these constraints a number of options are available. A brief comparison of validity procedures within three paradigms, namely, postpositivism, constructivism and critical is provided here (Table 2.2) is to inform the choices made:

Table 2.2 Validity procedures within qualitative lens and paradigm assumptions (from Creswell & Miller 2000, p.126)

Paradigm assumption/lens	Postpositivist or systematic paradigm	Constructivist paradigm	Critical paradigm
Lens of the researcher	Triangulation	Disconfirming evidence	Researcher reflexivity
Lens of study participants	Member checking	Prolonged engagement in the field	Collaboration
Lens of people external to the study (reviewers, readers)	The audit trail	Thick, rich description	Peer debriefing

The validity procedures reflected in postpositivist thinking seeks the equivalence of quantitative procedures (e.g. Maxwell, 1992), while constructivist thinking advocates criteria with labels distinct from quantitative approaches, such as trustworthiness and authenticity (see Lincoln & Guba, 1985). A critical paradigm calls validity criteria (as established by the researcher) into question as a number of meta-narratives or structural elements – such as social, political, economic and gender – are

considered to influence the credibility of the study; procedures of self-disclosure and collaboration are therefore advocated (Creswell & Miller, 2000). Lincoln and Guba (1985) provide a detailed framework for affirming the trustworthiness of naturalistic approaches using criteria of credibility, transferability, dependability and confirmability. The following chapter includes a section that elaborates on how trustworthiness could be ensured in the application of the methodological approach argued for in this chapter.

2.7 Consideration of ethics

While the specific application of ethical conduct in relation to this study is discussed in Chapter 3, it is noted in this chapter that researchers should be personally aware of their responsibilities in relation to ethical conduct. The choices made in this study were guided by Flinders (1992), who proposes four ethical frameworks, namely

- Utilitarian,
- Deontological,
- Relational, and
- Ecological.

Utilitarian ethical considerations were derived from large sample quantitative research conducted primarily in the medical field. The concepts of relevance to qualitative research include informed consent (associated with the recruitment of informant's stage), avoidance of harm (associated with the fieldwork stage) and confidentiality (documenting and report writing stages) (Flinders, 1992).

Deontological ethics can be distinguished from utilitarian ethics by the "assertion that moral conduct cannot be fully validated on the basis of consequences alone" (Flinders, 1992, p.104). Utilitarian ethics are intended to serve the needs of the researcher while not harming the interviewee, while deontological ethics argue against using interviewees as subjects or research pawns who provide a means to an end in research. Instead the researcher should conduct her work with honesty, justice and fairness and "avoid wrong" (Flinders, 1992, p.105).

Relational ethics advocates that ethical goals should be informed by a caring attitude for others. The relationship with interviewees should be one of collaboration in the recruitment stage, striving to avoid imposition in the fieldwork stage and non-judgmental approaches to representing or confirming what participants are trying to achieve.

Ecological ethics should extend informed consent to cultural sensitivity, go beyond avoidance of harm to avoidance of detachment and an emphasis on confidentiality in reporting should be replaced with socially responsible modes of communication (Flinders, 1992).

Concluding remarks

This chapter has presented a position that reality exists at the level of the empirical and beyond, with an argument of the merits of critical realist ontology. It focuses on the view within critical realism that reality can be accessed through the meanings made by individuals and proposes that personal construct theory provides access to these meanings. The repertory grid interview as a mechanism for data collection which is coherent with personal construct theory is presented followed by a description of the process of grounded theory emphasising what it has to offer as an approach to analysis.

In Chapter 3, the actual processes of collection of data from interviews and the analysis of this data are described using the framework explained in this chapter.

Chapter 3 Application of research methods

> *"If you want to know how people understand their world and their life, why not talk to them?"*
>
> (Kvale, 1996, p.1)

Introduction

This chapter provides a description of the research context over the period of the study in order to contextualise the data and the findings. This will include the underlying theoretical framework informing the design of the course, pedagogical aims and pedagogical learning activities.

This is followed by the application of the research framework described in the previous chapter in the context of the study. A description of how the study was conducted including elements of research design, data collection and analysis procedures will be illustrated. This chapter serves to link the methodology to the research strategy. It illustrates how the researcher actually conducted the inquiry. The chapter concludes with a discussion on how trustworthiness was established in the research process.

3.1 Research context

The Systems Practice course which is the context for this research study consists of two modules which are sequenced with the second module representing more complex information intended to build upon the first module. As a curriculum characterised by a hierarchy of abstraction and conceptual difficulty, this approach to curriculum is considered by Muller (2009) to be based on *conceptual* coherence. The two modules are structured in the following manner:

Module 1: A systems approach to personal management practice.

This module included an emphasis on awareness of self and self in relation to others and self in relation to practice i.e. context of application. Examples of the content and learning activities for module 1 are included in Table 3.1:

Table 3.1 Course module 1.

		Examples of Knowledge areas		
		Learning theory	Management theory	Systems theory
Skills and competencies	Systems tools and techniques e.g. interrelationship diagraph, causal loop diagrams, analysis and synthesis	→	→	→
	Communication: Report writing and verbal presentations	→	→	→
	Action research	Integration of knowledge areas to address problem		
	Reflective practice	Learning logs and critical incidents	→	→
	Group work	Contact module activities	→	→

Examples of content that would be delivered in the form of learning events:

- Learning theory (including the Kolb experiential learning cycle; Argyris and Schön theories of action; and single and double loop learning);
- Introduction to systems concepts, for example, Boundary, recursion, feedback, emergence;
- Management theory;
- Tools for understanding and developing knowledge: for example, sense making, mental models, ladder of inference, mindfulness (based on constructivist principles);
- Systems tools and techniques: for example, rich pictures, interrelationship diagraphs, causal loop diagrams as approaches for analysis and synthesis;
- Report writing, action research, techniques for reflection.

Module 2: Systems approach to organisations.

This module included systems methodologies and models. Examples are included in Table 3.2:

Table 3.2 Course module 2.

		Examples of knowledge areas			
		Cybernetics and viable systems modelling (VSM)	Soft systems methodologies (SSM)	Organisational fitness	Work systems
Skills and competencies	Systems tools and techniques e.g. interrelationship diagraph, causal loop diagrams, analysis and synthesis	→	→	→	→
	Communication: Report writing and verbal presentations	→	→	→	→
	Action research	Integration of knowledge areas to address problem	→	→	→
	Reflective practice	Learning logs and critical incidents	→	→	→
	Group work	Contact module activities	→	→	→

Application is practiced in class exercises and contextual knowledge development through the processes of analysis and synthesis is emphasised in work based assignments. In Table 3.3 examples of class based activities are included with accompanying explanations. The bulk of the assessment is through individual intermodular projects. A group assignment is intended to represent a synthesis of the concepts and theories of the context lectures as a theoretical framework, the group assignment would often include an application of this framework to a case study either proposed by the students or presented by the facilitator as a class exercise.

Individual assignments consisted of three papers; a position paper, an action learning project and a critical incident log. These three assignments are respectively intended to address the abilities of theory building and argument, management practice, addressing the ability of students to identify and

intervene in problem situations, and self reflection. Guidelines for content, report structure and an assessment matrix were provided to the student.

The course designers made the decisions regarding content, process, pacing and framing of the lecture sessions. Some flexibility with regarding to the timing of particular activities was negotiated with students. Although the intermodular assignments provided a template, the students were required to contribute topics which were drawn from their work contexts.

The principles informing the course design includes:

- Learner centred events rather than teacher centred;
- Experiential learning;
- The use of multiple sources of authority, e.g. literature, as resources for review by individuals, in conjunction with expert contributions by facilitators; and
- Group based learning.

Table 3.3 Class based activities

Activity	Explanation
Group learning	Various trial-and-error methods had been used with cohorts for selection of groups. For example, Kolb's learning styles inventory had been used with cohort 1 and 2. In the case of cohort 3, course participants were invited to write a motivation for the composition of their groups after they had engaged in an intensive orientation process which involved getting to know their peers. There was an expectation that the groups would be self-organising e.g. engage with the learning process and the task with the purpose of maximising their learning. The primary group deliverable for the contact week of a module is an assignment documenting the application by the group of the course content. This exercise involved a process of analysis and synthesis using techniques such as rich pictures, interrelationship diagraphs and causal loop diagrams. Systems ideas such as making boundary judgements, circular causality, and feedback were incorporated in these activities.
Individual study	The students were introduced to techniques for reading and analysing the articles and book chapter readings provided by the facilitator. During allotted class time period's students were asked to read and draw out key ideas, propositions or concepts which they would need to discuss with others in their groups. The assumptions underpinning this activity include its purpose as an experiential exercise for developing reading and analysis skills, and as a vehicle for recognition that the student can play a role in knowledge construction. As it is designed, this activity is potentially a high risk strategy for the student as their selections inform the theoretical synthesis of the readings for the group. The pace at which different individuals read appears to undermine this activity.
Lectures	The lectures are intended to provide expert input with respect to discipline or knowledge areas, techniques and methodologies. There were a range of teaching styles with some facilitators presenting in a more conservative lecturing style with Power Point slides, while others had participants seated in a circle and structured the lecture by leading a discussion. There were facilitators who used multiple sources of data and techniques such as media clips and newspaper articles, in their lecture sessions. Participants were generally encouraged by facilitators to contribute to discussions.
Other class based activities	These included discussions, reflection activities, presentations and feedback, and physical exercise primarily to keep participants engaged, active, and involved.

3.2 Data Collection

Data collection primarily took the form of interviews with both the structured repertory grid interview and semi-structured interviews used at different points in the study. The study of the context included observations of lectures and class activities, and the review of documents in the form of student

reports, programme and course documentation and assessment rubrics. Other instruments such as survey questions were experimented with to test emerging categories as they were developed in the analysis process. In order to protect the identities of participants and retain confidentiality, pseudonyms or codes were used in transcripts and reporting of interviews.

3.2.1 Interviews

Interviews were conducted with three different cohorts of students, with each cohort representing a group of students who started the course together and attended lectures and class based activities as a group. The interviews with the first cohort were exploratory and provided an opportunity to refine the interview protocols. With this cohort, purposive sampling was used as it was anticipated that the diversity in terms of age, race, occupation, gender, managerial and work experience in a range of work environments ranging from large corporations to small partnerships, public and private enterprises, and educational backgrounds would provide a range in responses. Eight candidates were interviewed, all interviews were transcribed and the transcripts were analysed.

The second cohort of students represented a smaller number and all participants who agreed to participate in the research process were interviewed. The same cohort was interviewed at different stages of the programme, with an attrition of students participating in the study:

- Interview 1 (prior to starting course in systems thinking): 5 candidates
- Interview 2 (after the first contact module): 4 candidates
- Interview 3 (after the second contact module): 4 candidates

The third cohort of students interviewed were a class of 10 students. All students were interviewed and a number of interviews were conducted with each student. These interviews were conducted as illustrated in the schedule below:

- Interview 1-prior to starting course in systems thinking
- Interview 2-after the first contact module
- Interview 3- after the second contact module

A first round of interviews with cohort 3 was conducted to establish the views of learning of people prior to participating in the postgraduate course, using repertory grid elements primarily about their learning in relation to work and the organisations in which they worked. In the second round of interviews, questions centred on the experience of the contact module and the intermodular assignments as learning events.

In the case of interviews prior to participation in the course, the element elicitation questions were adapted to suit each individual context and followed the general format of inclusion of learning events which were significant to individuals. Students were thus invited to make meaning of their workplace experience as learning and were asked to identify both positive and negative learning events in the workplace. These represented elements. By presenting students with the qualifiers of "how" or "what" you learnt provided an opportunity for individuals to reflect on and identify incidents of learning which did not clearly fit descriptions as product or process but served to provide an opportunity for qualitative data on the experience. The interviews were recorded and transcribed. A detailed example is provided in box 3.1 to illustrate the application of the repertory grid process format used for interviews. This example reflects an interview (box 3.1) conducted prior to commencing lectures for module 1 of the course:

Box 3.1: Example of a Repertory Grid Conversational Interview

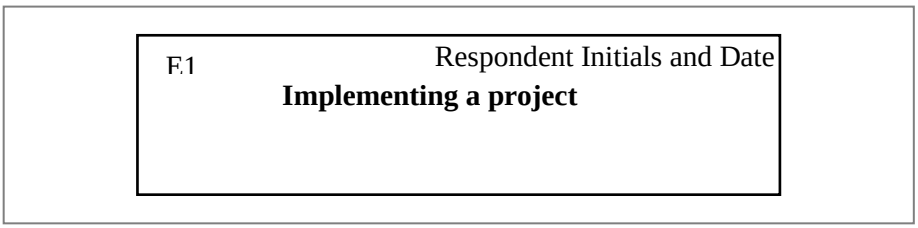
Stage 1 (Elements): The respondents were invited to make meaning of their workplace experience as learning and were asked to identify both positive and negative learning events in the workplace. These represented elements. Presenting respondents with the qualifiers of "how" or "what" you learnt provided an opportunity for individuals to reflect on and identify incidents of learning.

Example of *element elicitation question*: What is the most significant learning event in your work environment?

Respondent Answer: Project X (Element) e.g.

1. E1 Implementing a project.
2. E2 Implementing a disaster recovery solution for my company.
3. E3 Changing the role of a project team.
4. E4 Software development project
5. E5 Marketing a new company

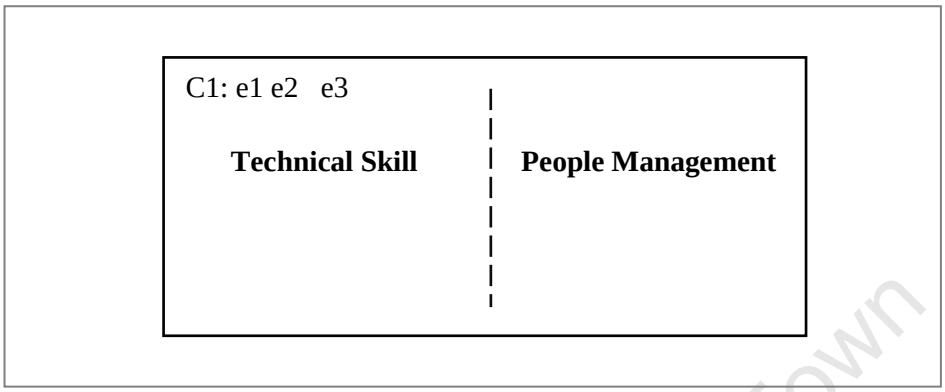
Stage 2 (Constructs): Respondent is then presented with 3 *elements* on three separate pieces of card e.g. E1, E2, E3, see the example below.



Example of element card.

Question for respondent: Can you think of one way in which two of these elements on these cards are alike or have something in common and different from the third? In terms of how you learnt or what you learnt? (qualifying question)

The answer is the *construct* which is written as two phrases or descriptions separated by a hyphen or line, e.g. Technical skill - People Management



Example of card showing construct.

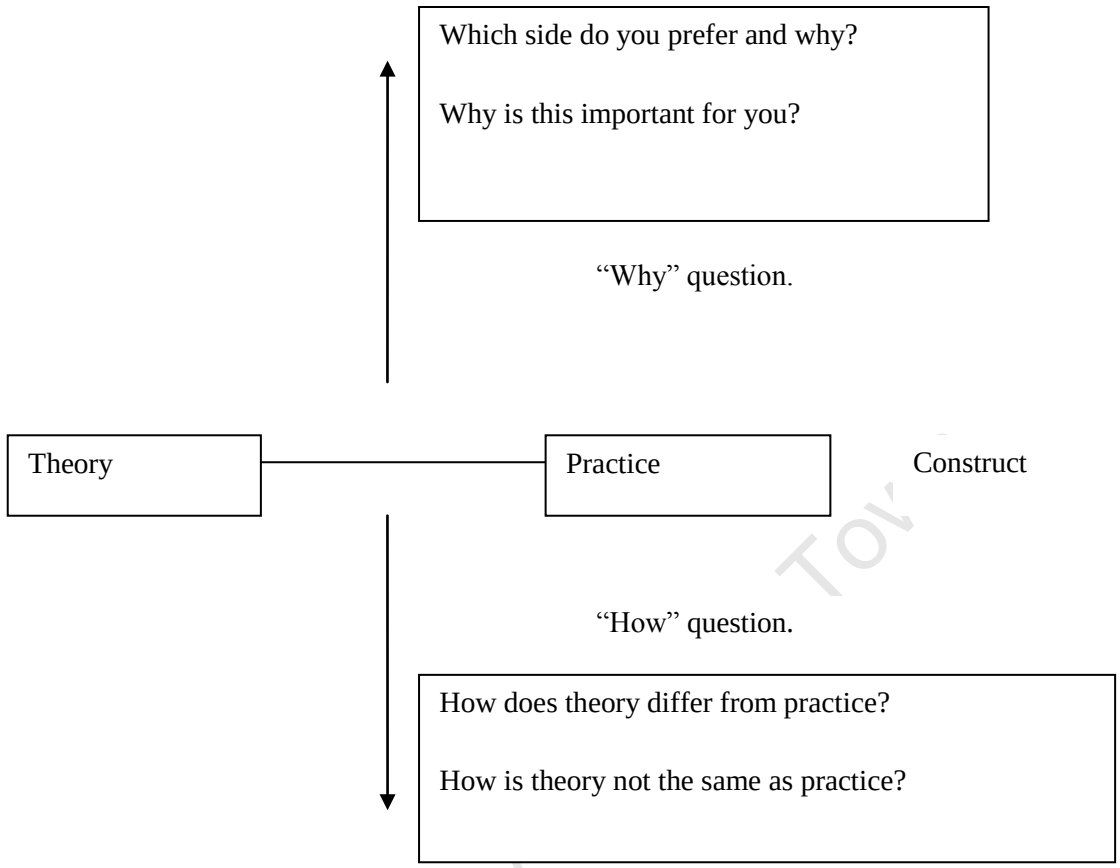
This represents the construct elicitation phase using triadic comparison. Some of the examples of descriptions or phrases which make up the constructs that were produced are as follows:

Partial Construct List and Qualitative Coding.

Emergent Pole of Construct	**Implicit Pole of Construct**	***Preliminary Coded Category of the Construct***
Technical skill	People management	*Acquiring Knowledge*
Manage the task	Manage the person	*Methods of working with people*
Understanding the bigger picture	Focus on the personal	*Acquiring Knowledge*
Can control	No control	*Performance*
Skills	Gaining understanding	*Acquiring knowledge*

Stage 3 (Laddering): The laddering process using the first construct was conducted by asking "do you prefer learning a technical skill or people management"? Why? When probing by laddering down, one could ask "how

does learning a technical skill differ from learning to manage people?" This laddering process yielded rich qualitative data in addition to refining constructs.



Illustrating the process of laddering (adapted from Pollock, 1986)

Stage 4 (Grid construction): The interviews advanced to the grid construction phase, using a grid format listing elements along the top and constructs along the side of a matrix. Constructs were allocated to elements by rating them.

3.2.2 Observation as data

Lectures, student meetings and workshops were observed both during the contact lecture blocks and during the intermodular period. The observations extended over a period of approximately six months for each cohort. Field notes of these observations consisted of documenting the observations in a notebook with a second column with documented impressions, reflections, memos or notes (see Appendix B4 for an example). In the case of the third cohort, each day of the contact module included a morning "check-in" and an end of the day "check-out" where students were asked to reflect on and share their experience of the workshops. These observations provided ethnographic data which informed the analysis process and provided descriptive contextual data with respect to the theories-in-action of the facilitators of the lecture sessions, physical classroom arrangements and activities.

3.3 Approach to Data Analysis

> *Defining concepts is frequently treated by scientists as an annoying necessity to be completed as quickly and as thoughtlessly as possible. A consequence of this disinclination to define is often research carried out like surgery performed with dull instruments. The surgeon has to work harder, the patient has to suffer more, and the chances for success are decreased*.
>
> (Ackoff, 1971, p.671)

3.3.1 Repertory grid analysis

The data transcripts derived from the interviews conducted with the first cohort was treated to analysis in conjunction with the constructs elicited in the repertory grid interview. The grid data including the elements and constructs and the rating of constructs against elements were entered into EnquireWithin software to generate dendritic analysis which produced grids (see example in Appendix D2). Correlations between elements and constructs were thereafter treated to cluster analysis which entailed the grouping of constructs with a high degree of correlation (see example Figure 3.1). These relationships were used to generate codes in the grounded theory analysis, for example, the terms "understanding", "applying" and "self improving" in Figure 3.1 indicates that these terms have similar meaning for the interviewee in contrast to "self improvement" or "personal development" in the context of the study. This therefore provides clues to inform the codes or category in the grounded analysis.

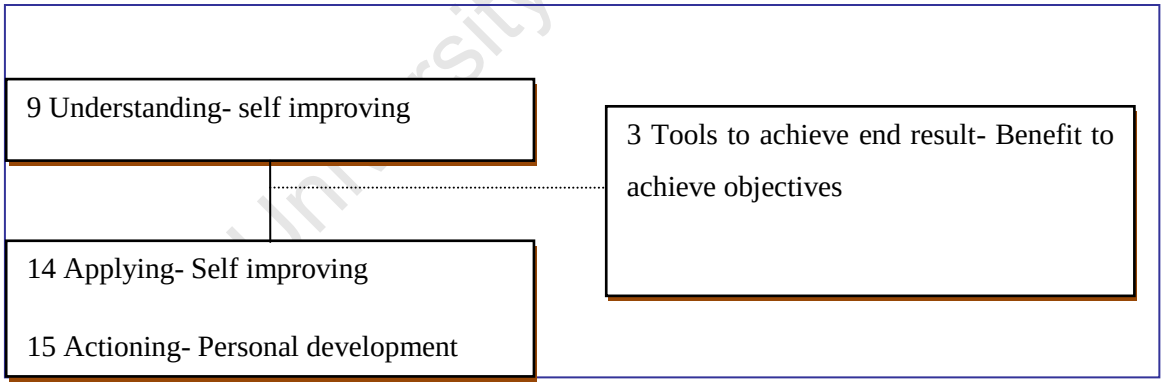


Figure 3.1 Correlation of construct cluster for coding

The learning events identified as *elements* differed in terms of complexity, context, objectives, consequences and strategies both between respondents and between the *elements* of individual respondents. The contexts included course content (e.g. work systems) and pedagogical devices (e.g. group dynamics). The structured process of the repertory grid interviews provided a challenge as the application as used in the context of this study differed from the dominant use of RepGrid which relies on using individuals or role titles as *elements*. Defining the boundaries for *elements* was an exploratory process and the challenges it presented in this study is likely to remain so when used in an

environment where learning is individual and personal and *elements* are self selected. The RepGrid interview as a conversational tool provided rich data for the primary analysis using grounded theory. The interview transcripts of the conversational RepGrid interviews were the primary source of data. The *elements, constructs* and ratings that were elicited and recorded during the interview, also provided grid data. This provided emerging codes for the grounded theory analysis as preliminary relationships were established as part of the interview process.

Figures 3.2 and 3.3 are examples of the clustering process of elements and constructs based on rating by student 5, cohort 1. The clusters where the correlations are high are indicative of perceptions of those areas as integrative or similar.

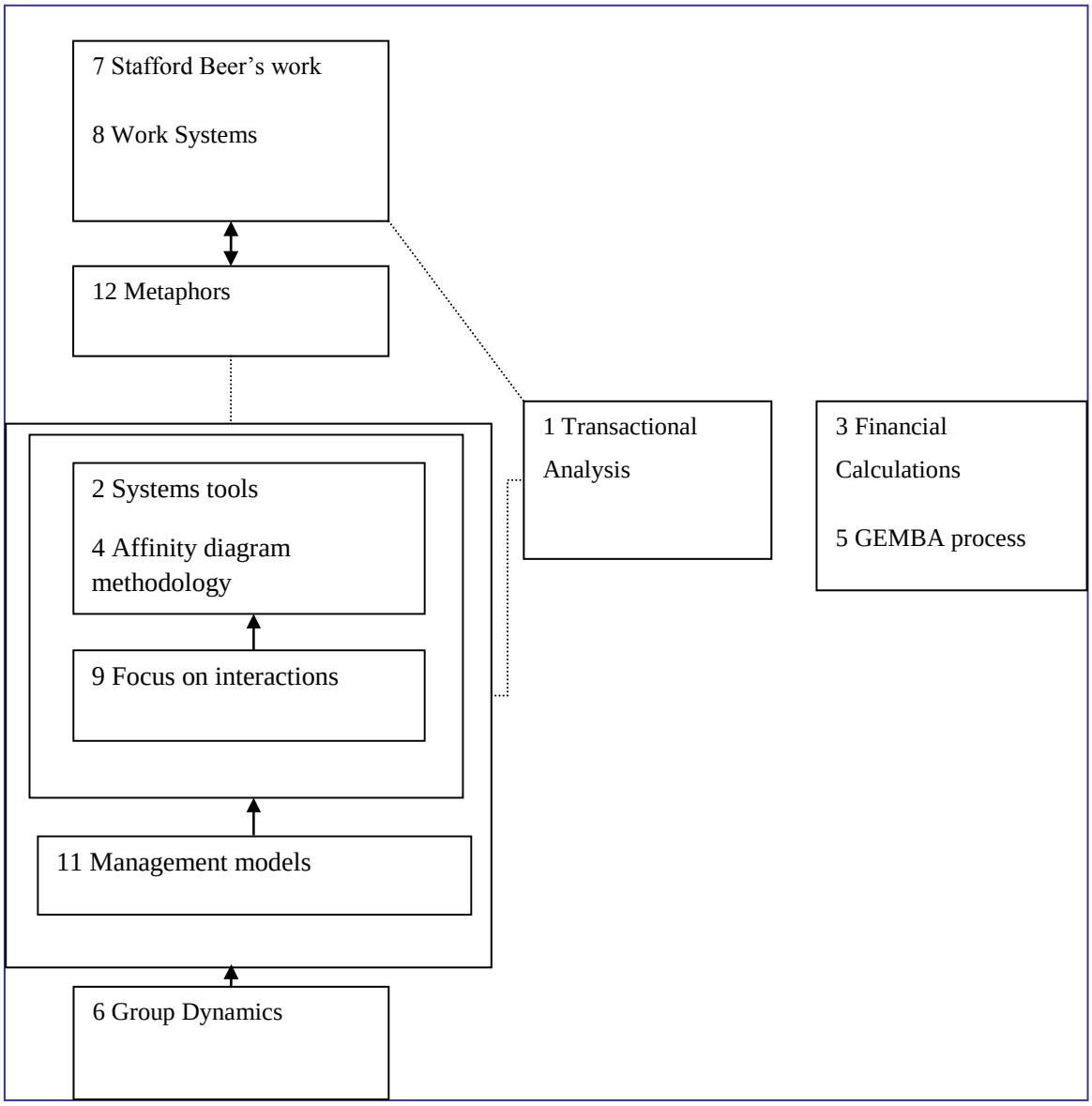


Figure 3.2 Student 5, cohort 1 element clusters

In Figure 3.2, correlations indicate above 95% for elements 7 and 8 with 12 as one family. The second family has 2 and 4 above 95% plus 9, 11, and 6. Elements 3 and 5 are correlated at about 85%. In the third cluster, 1 is correlated with clusters 1 and 2 at about 87%. These values are not considered for their statistical significance; instead they serve to demonstrate that there is little differentiation made between elements.

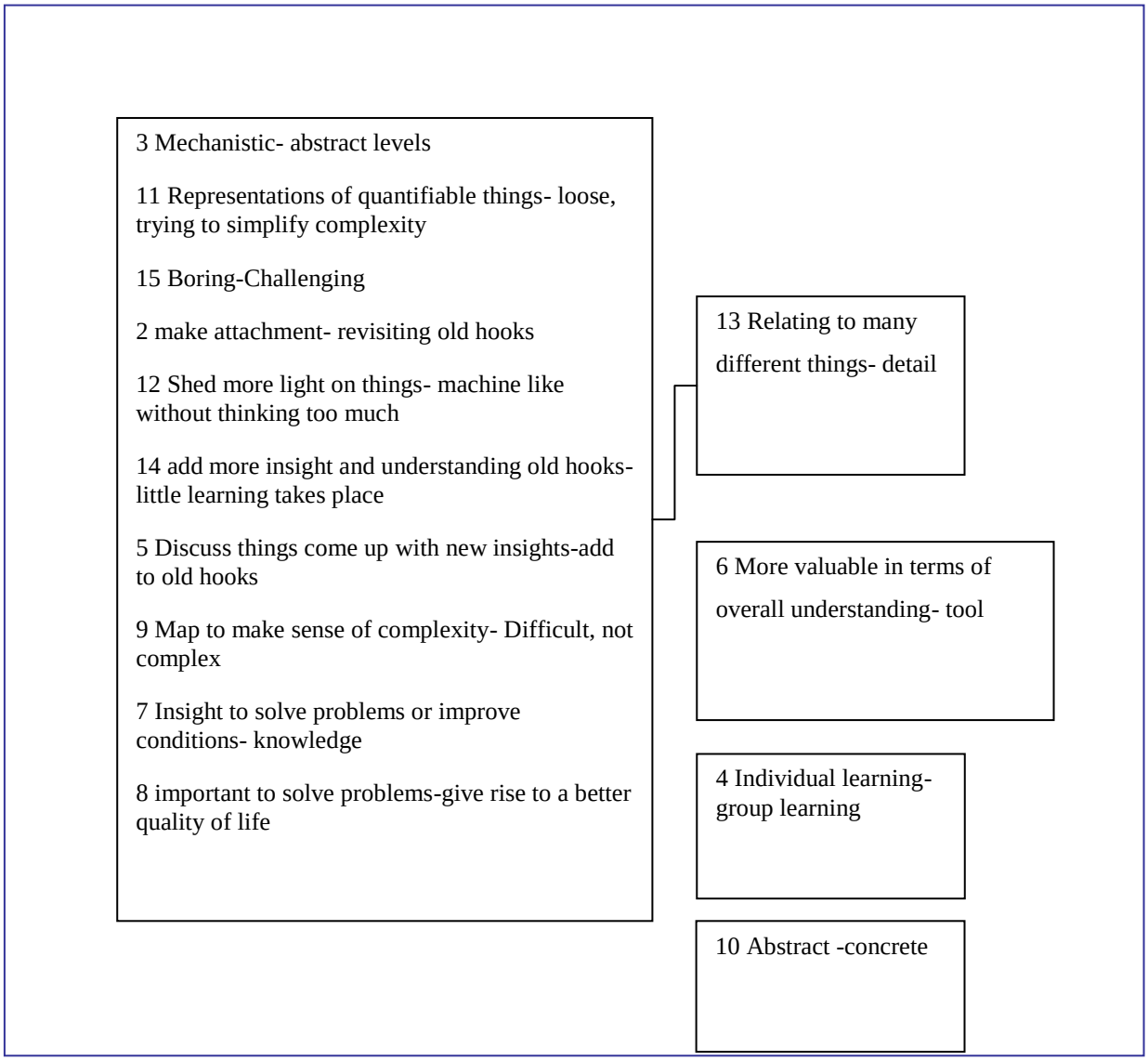


Figure 3.3 Correlations of constructs for student 5, cohort 1

In Figure 3.3, it was evident that all constructs are highly correlated (>95%) with the exception of constructs 6, 4 and 10 and 13. The large, dense cluster of constructs reveals that learning is characterised as adding more insights and understanding, it distinguishes between conceptual and concrete and demonstrates that the student makes pragmatic choices about the relevance of learning. As with the elements in Figure 3.2, these values are not considered for their statistical significance; instead they serve to demonstrate the similarities and account for differentiation between constructs.

3.3.2 Grounded theory analysis

The transcripts of interviews were analyzed manually or "by hand" (Miles & Huberman, 1994) which means that although the transcript was organized into fragments on computer for coding, qualitative data analysis software was not used. This decision was informed in part by the concerns raised by others of a tendency to overemphasize coding when using software and the potential for superficial analysis (Charmaz, 2003, 2006; Lonkila, 1995) and by the practical approach of working with data as transcripts became available. This initial coding process involved sorting and reading the transcripts while comparing them to the audio recordings. The transcripts were searched for themes and patterns explaining students learning, and the coding resulted in a descriptive set of categories. Subsequent iterations and comparisons yielded relationships between the categories related to learning, and the learning context. The results of the detailed analysis of these categories are presented in chapters 4 and 5.

Each set of interviews of each cohort was first analysed separately, drawing out concepts through comparing and contrasting before comparing and contrasting with initial codes from other cohorts. Memos accompanied the process to flesh out ideas and engage with emerging codes as prompts for expanding understanding of the concepts.

The process of analysis was accompanied by theoretical sampling which Charmaz describes as "starting with data, constructing tentative ideas about the data, and then examining these ideas through further empirical inquiry" (2006, p.102). After initial analysis of the data collected from cohort 1, tentative categories were developed. These categories were extended and refined with data from cohorts 2 and 3. This strategy of gathering more data in order to develop and define categories contributes to the development of theory through elaborating and refining categories to the extent of achieving saturation where no new properties of categories emerge (Charmaz, 2006). Data from subsequent cohorts contributed to renaming of categories and provided additional properties of categories.

Figure 3.4 is an outline illustrating the coding process. This is followed by a detailed description of each stage of analysis.

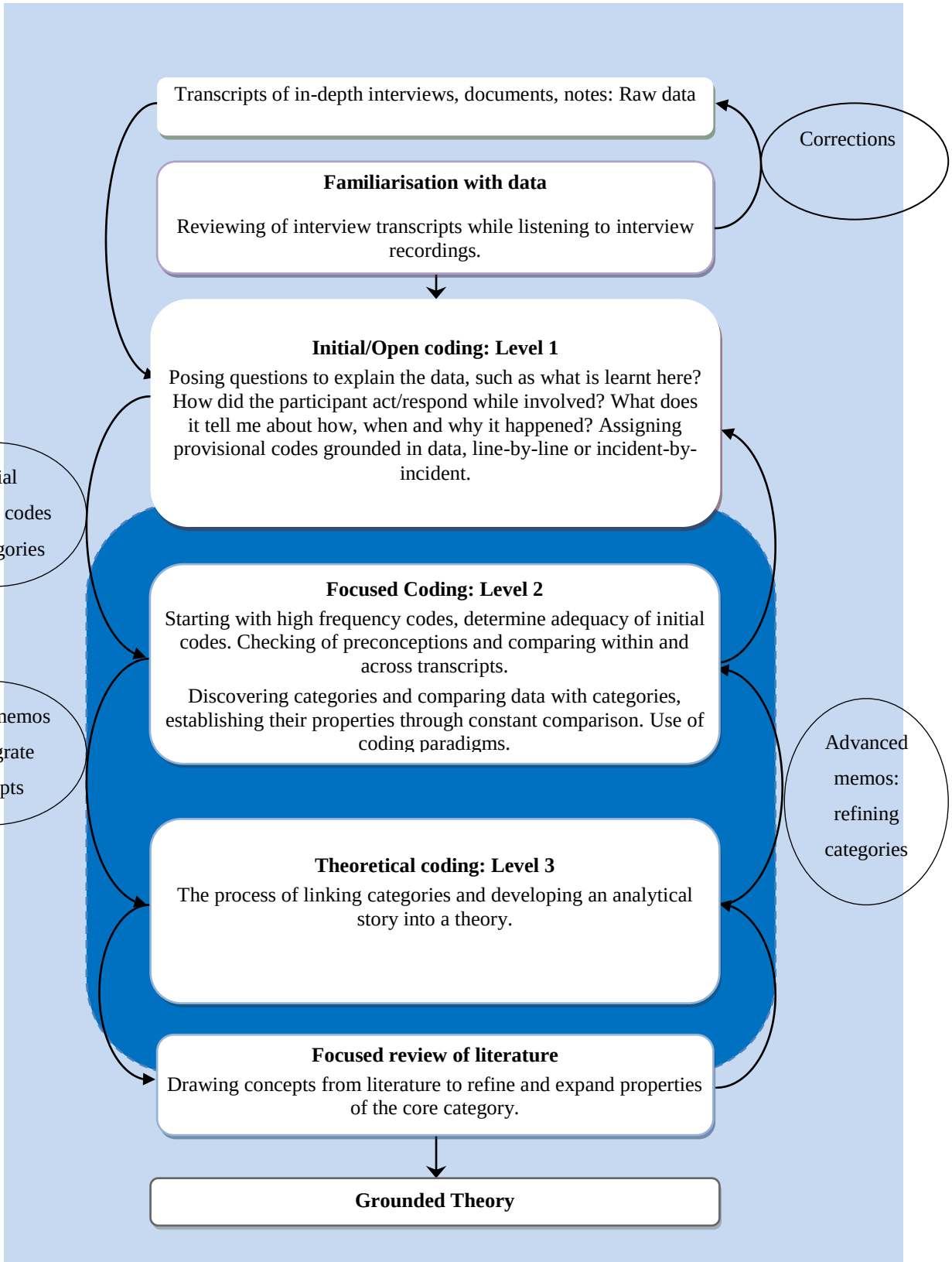


Figure 3.4 Outline of the coding process of interview transcripts

Level 1 Open coding

Coding of the interview transcripts was done at different stages of the study and required immersion in the data for extended periods of time to develop concepts in an iterative process. Data fragments were compared and contrasted with emerging categories as part of the process of defining and refining the concepts as codes. Establishing relationships between codes required moving up and down levels of abstraction to confirm how they related to or could be distinguished from one another. The process of refining through comparing and contrasting incorporated a number of iterations, testing and checking using different approaches and comparing with memos. Table 3.4 illustrates the process of assigning codes to data fragments.

Following through from the examples of RepGrid analysis shown in Figures 3.2 and 3.3, an excerpt from the interview transcript of student 5, cohort 1 is shown below with examples of level 1 code. The open codes were initially descriptive, remaining close to the vocabulary of the interviewees, with the conceptualisation becoming more abstracted as code-to-code were compared.

Table 3.4 Open Coding- assigning codes/conceptual labels to data fragments (Student 5, cohort 1).

Student 5 cohort 1	**Conceptual labels**
... Facilitator A just blew me away totally, so perhaps for me my primary learning from him is that obviously the system always gives feedback and concepts of whatever you learned today was going to be irrelevant tomorrow, in fact it is impossible to keep up with the rate of change...	Explaining personal response to facilitator Learning systems concept of feedback Learning fallibility of knowledge as a concept Understanding the impossibility of keeping up with rate of change

A number of formats were used to "try out" concepts which represented the condensed data, for example, groupings of learning events were condensed and represented as diagrams for easy access and interpretation. As the process of analysis advanced, a coding system was established for ease of access and comparison.

Danermark et al. (2002) advise that theorising is a process of continuously structuring, restructuring and adjusting abstractions to avoid those irrelevant abstractions which could contribute to diminishing the usefulness of knowledge. The coded data were inserted into a coding template which represented broad themes as shown in Table 3.5.

Table 3.5 Open Coding- coding template sample for the code *Systems Thinking*.

Data fragment for level 1 coding	Conceptual label	Notes or hunches
... my primary learning from him as that obviously the system always gives feedback	Systems concept of feedback	Learning concepts
…I think in systems thinking you have to have context if it is going to make sense to you…	Importance of context to make sense of Systems thinking	Not irrespective of context
…you realize actually the power of visualization, the power of using systems to model what you are doing…	Realization of the power of visualisation Realization that using systems for modelling is powerful	Tool for modelling?
…I think what this course is teaching us is actually a new way of thinking, resisted by the current status quo, and although it might be a better way of doing things it is not going to come around overnight. The more people who are schooled in systems thinking the easier it will be adopted…	Expressing that course actually teaches a new way of thinking Way of thinking resisted by status quo Better approach but adoption of approach requires more people to be schooled in ST.	Need for competence for design of shared mode of discourse for successful application? Recognition of personal value but seeking support/like-mindedness to facilitate application.
…I would like them to do this, because I do not want to go and battle with my new train of thought in an environment that does not encourage it….	Relationship with work practice/discourse.	Disempowered to effect change.
I think it would be of interest to some people, of course to others they focus on outcomes.	Status quo	Systems discourse
Once they get into the working world it is just about outcomes. Producing the right outcomes.	Working world as a constraint to ST approach. Focus on outcomes seen as conflicting with ST.	Possible structural constraint for workplace application

Level 2 Focussed Coding

In the process of examining the codes for further analysis, the data was re-examined to check the adequacy of codes in terms of distinctiveness or description. In the process of abstracting the codes to provisional categories and differentiating one category as distinct from another, subcategories were also identified. Each category incorporated subcategories which represent the properties of the category. Strauss and Corbin (1990, p.61) describe properties as "attributes or characteristics pertaining to a category".

Table 3.6 shows the example of the emergent code grouping, with relationships of similar properties group together from a process of comparing and contrasting level 1 codes. This process was repeated for all emergent categories. Emergent categories and themes from data were compared in table format.

Table 3.6 Level 2 coding: Sample of code groupings.

Systems concepts/ discourse	**Toolbox**	**Skills**	**Application/ Modelling**	**Ways of thinking**
• Concepts dealing with Interconnected ness • Rate of change • Feedback • Relationships	• Tools/techniques for use in the workplace • Tool for solving problems	• Skills for building awareness for work effectiveness . • Interpersonal skills	• Modelling • Making sense of complexity	• New ways of thinking • Changing perspectives • Higher level of thinking • Thinking holistically

Level 3 Theoretical Coding

Glaser argues that theoretical codes "weave the fractured story back together" (Glaser, 1978, p.72). In a process of integration, theoretical codes lend form to the focussed codes from prior stages of analysis, conceptualise relationships between substantive codes and move the analytical story in a theoretical direction (Charmaz, 2006). The use of coding families, such as the "Six C's: Causes, Contexts, Contingencies, Consequences, Covariances and Conditions" from Glaser (1978, p.74), can be implicitly or explicitly incorporated into the substantive analysis to frame the theory in a way that adds clarity and precision (Charmaz (2006). Glaser (1978) lists a number of possible coding families

which are extended upon by Charmaz to include those that focus upon "agency and action, power, networks and narrative biography and more recently, theoretical currents such as feminist theory and postmodern concepts from other families" (2006, p.66).

In practice, this stage of the study involved a series of analytic activities. Attention was paid to the use of metaphors and different combinations of coding families were used in this study. Various techniques were used as a process of hypothesising or testing the relationships between categories in Level 2 coding. The focus on categories of consequences for example, changes as effected by a learning event, and specifically change as a consequence of a learning event associated with systems thinking, resulted in an integration or collapsing of codes into four categories of consequences, namely, *change in thinking*, *change in approach to problem solving*, *change as personal development* and *change in worldview*. This particular group of consequences contributed to the phenomenon of *knowing the change*. Further examination of codes brought the realization of codes that were linked as causes of the consequences that emerged. These were of particular interest as the study also sought to identify mechanisms of change using a critical realist lens. Understanding the abstracted categories as consequences, in conjunction with categories relating to conditions and context, was necessary for developing categories related to causes.

This process resulted in a reduction of the number of codes or conceptual labels to nine (9) phenomena from the categories which contributed the main components to the substantive theory.

Table 3.7 Level 3 coding: Phenomenon of *Knowing the Change*.

Change in thinking	Change in approach to problem solving	Change as personal development	Change in worldview
	• Pragmatic selection from toolbox for application. • Collaborative problem solving strategies.		

3.3.3 Structural Analysis

The six stage analytical process which entails moving between the concrete and the abstract proposed by Danermark et al. (2002) was used as a guideline to explore the causal mechanisms generating events and interactions between them. The stages, as described below, are not necessarily distinct or sequential as recommended by Danermark et al. (2002).

Stage 1: Description: In this study, the grounded theory analysis provides an inductively derived description of the phenomenon through analysis of data from participants.

Stage 2: Analytical resolution: Phenomena can be described by considering a number of causal mechanisms, for example, learning can be accounted for through the interactions between several different potential causal components. In this study, mechanisms and their effect at socio-cultural levels are considered.

Stage 3: Abduction/ theoretical redescription: Plausible explanations are provided through drawing on existing theories.

Stage 4: Retroduction: Identifying and describing several generative mechanisms to explain the phenomena, drawing from psychological and socio-cultural theories.

Stage 5: Comparison between different theories and abstractions: testing theories against one another for explanatory power and making selections for complementary theories.

Stage 6: Concretization and contextualization: Answering the question of how do the mechanisms manifest concretely.

This approach was used to explore the socio- cultural conditions which enable or constrain student success in the learning of systems thinking both in the university classroom and the workplace as the context for application for assignments.

3.3.4 Writing in the literature

Glaser (1978) makes the point that in grounded theory studies, the researcher may not know which literature is relevant to the field study until the study is well advanced. In this study, literature was written in at different stages. Firstly, in developing an emergent empirically grounded theoretical model the phenomena developed was integrated with existing theory where the literature is written into the empirical story in order to clarify, validate and extend the findings. In doing so, seeking attributes of the concept from the literature required searching for clues as to how the authors describe the concept. This can be viewed as qualitative data that directs the researcher to further analysis as classification of the data into the attributes, antecedents and consequences of the concept (Baldwin & Rose, 2009). Table 3.8 is an example of classifying a concept using literature sources. This approach was adopted in a flexible rather than procedural fashion to capture their meaning in the context of the theoretical frameworks in which they were derived.

Table 3.8 Concept analysis of 'systemic thinking'

Antecedents	Attributes
Systems knowledge, skills, communication, epistemic cognition	• The ability to balance the processes of analysis and synthesis, • The ability to abstract from complexity to reveal rather than impose organizing structures (visual, mathematical, conceptual), • To practice flexibility and real-world change with the conceptual need for stable boundaries, (Salner, 1986)
Systemic Thinking	
Consequences	
• Use of multiple methods for problem solving rather than employing a limited range of algorithms, • Making sense of context i.e. understanding that the "map is not the territory' and use systems models accordingly (Salner, 1986).	

Thereafter, once concepts were established, the literature was used to inform the reasoning process to include considerations of underlying social structures. This included redescription, retroduction and theoretical comparison.

3.4 Trustworthiness

3.4.1 Credibility

Creswell and Miller (2000) assert that as a validity procedure, the onus for triangulation is on the researcher. This is achieved through a process of refinement, for example, the sorting process in RepGrid eliminates or identifies overlapping areas for elimination and multiple methods. The RepGrid obtains data which can be analyzed both qualitatively using hermeneutic or grounded theory principles and quantitatively using principal components analysis, the results of which can be presented visually. This effectively provides two measurement processes for managing the data providing corroborating evidence through multiple methods of analysis.

3.4.2 Dependability

The efforts to ensure dependability included considerations of consistency across all 3 cohorts in how interviews were conducted and interviewees managed. The data from each of 3 cohorts of students were first analysed separately, the process and outcomes of analysis was discussed with my supervisor.

3.4.3 Transferability

A detailed description of the context is provided to aid researchers to identify possibilities for transferability of the research findings. The description of the assumptions, procedures and data analysis processes as documented in the body of the thesis and appendices is intended to provide sufficient guidance to other researchers to transfer the conclusions or repeat the procedures in other contexts.

3.4.4 Confirmability

Audit trail

The RepGrid interview generates a residue of records which are consistent with the Halpern audit trail categories (Halpern 1983, in Lincoln & Guba, 1985):

- Raw data in the form of interview transcripts, element and construct cards;
- Products of analysis and data reduction, e.g. rating grid;
- Data reconstruction and synthesis products, e.g. completed grid showing correlations between elements and constructs;
- Process notes, e.g. design of the interview and methodological notes;
- Materials relating to intentions and dispositions e.g. in preparation for interview, the purpose was clearly stated; in agreeing to be interviewed, a consent form was prepared (see appendix C1);
- Instrument development information, e.g. schedule of element elicitation questions (see appendix B1).

Member Checking

At a number of points in the repertory grid interview, the respondent is given an opportunity to check and respond to the data. These include checking of elements when doing the triadic comparison, and reviewing constructs when laddering and rating. The laddering process provides the respondent with the opportunity to check if they had provided the information which reflected their understanding and intention. It also serves as a check of the researchers recording of the respondents understanding and intention.

3.5 Addressing ethical concerns

The relationship between researcher and other participants in a research process is a key consideration in the ethics of research. The approach of the researcher taken in this study parallels the *deontological* view with *utilitarian* elements as described by Flinders (1992). This involved the enactment of the values of the researcher which includes reciprocity (where both the researcher and the researched

were intended to gain), trust, fairness and respect, which approximate to the *deontological* view; while formally recruiting via informed consent, protection of confidentiality (sample document provided in Appendix C1) and conduct of fieldwork in a way which did not unfairly impose upon or harm others (*utilitarian* view). The sample interview (student 3, cohort 2, Thabitha) in appendix B 3 serves to illustrate that the style of interview was adjusted to accommodate the interviewee (who had expressed exhaustion after having had completed a week of intensive lectures). While the text on its own does not reveal the empathic tone, in the extract below (student 3, cohort 2, Thabitha) the interviewer responds to the interviewee's expression of exhaustion:

> *Interviewer You mentioned that fatigue played a very important role during your contact week, how did you deal with it, and, and what is it that you did initially that could have maybe contributed to being so tired, do you think that there were ways that you could have continued with the course maybe ease off the fatigue…*
>
> *Interviewee I find it a difficult one because the tiredness or the fatigue was being caused just about being here, you come here in the morning and you work, you work through the day basically I felt we should have taken longer lunches, we shouldn't have, it's okay for the first three to four days to cut lunch for twenty minutes, but by the time it came to, fourth or fifth day I felt that at that point we we just going, going, going, I think that fatigue definitely comes the fact that we were here from seven thirty in the morning till five at night, you go home and even if you don't think about it for a while, when you go to bed I think that is all in your mind there, and you got to undo your old thinking, you got to rethink, you got to rearrange your thoughts and I think even during your spare time, your break because it's so much that you're learning in such a short time, your brains working, working, working, so it keeps you going I find most days, I woke up at about three and I was dreaming about the stuff, I would wake up and I'd have concepts in my head and think, why am I so wide awake now, you know, but, so those things I found quite tiring…*

Observations of the lecture period revealed struggles in the group process and a sense of fatigue by the end of the week. As the interview was conducted shortly thereafter, it served as an opportunity for the researcher to show empathy and consideration.

Both the facilitators of courses and student participants were approached to explain the research study and to obtain consent to observe the classes. While it was clearly emphasized that participation was voluntary and participants were invited to engage one-on-one if they had any concerns or questions, the verbal agreement was unanimous in all classes.

For each individual interview, informed consent was obtained using a letter introducing the purpose of the research and the methods to be used. That the participation was voluntary was emphasized and

participants were invited to withdraw at any point in the process. The potential of the benefits such as gaining insight into their learning and personal practice, was discussed with each participant as was the commitment to anonymity and protection of privacy.

Concluding remarks

In this chapter, course documents, observation and conversational interviews are drawn on to provide a description of the context of the study and to explain the key concepts which informed the design of the course. This description is followed by the explanation of the application of the methods for the production and handling of data in order to develop an appropriate response to the research questions. The chapter makes a contribution to the thesis by establishing procedures of dependability and credibility in the data collection process. The next chapter provides the first set of findings as four key phenomena emerging from the analytical application.

Chapter 4 Findings: Learning events as contributors to change

Introduction

The findings of this study are derived from the analysis of the data collected using the methods described in chapter 3. The data from all three cohorts were analysed as part of the research process to include a variety of students' experience, contributing to the achievement of theoretical saturation.

In this chapter, the conceptually mediated grounded theory phenomena are presented as a narrative which emerged from the analysis of the interview transcripts and RepGrid categories. In the coding process relationships were established between and among the categories: these are represented as different phenomena derived from the data. These phenomena were further refined and developed through a process of analysis and integration with concepts from the literature. The phenomena discussed in this chapter are presented in a structure that is informed by coding families. The grounding of the abstracted phenomena is illustrated using selected verbatim quotes extracted from the interview transcripts. This narrative emerged during the theoretical coding process.

The findings in this chapter and the chapters that follow address the research questions introduced in chapter 1. These questions are repeated here for the convenience of the reader:

1. How do students experience learning events designed to develop systemic management practice?

2. What are the mechanisms that impact upon learning systemic management practice in this context?

3. What are the implications for pedagogical practice, i.e. designing and managing events for learning systemic management practice?

Given the nature of grounded theory, each question is not answered separately in this chapter. In chapters 7 and 8 the research questions are revisited and each is addressed specifically, thereby concluding the findings in order to fulfil the research aims of this study. The remaining sections of this chapter and the following chapter constitute a discussion of the phenomena emerging from the grounded analysis. In this chapter, phenomena are presented as four interpretive phases in an evolving process of learning. These phenomena are based on the analysis of what was stated by students, therefore inferences are not made at the empirical level that something does not exist if it is not stated.

4.1 Phenomenon 1: Starting out

When comparing the constructs elicited with students prior to commencing the first module with those experienced as part of doing the course, shifts were revealed in how learning was viewed. As

the module provided structured learning events within a particular timeframe, these were not unexpected. The data generated before module one was not coded as contributing to this phenomenon: the focus is rather on changes that emerged from the analysis of data pertaining to experiences while participating in the course.

In the *starting out* phase, the learning events were construed as clues for what was still to come: for example, that systems thinking would provide challenges to conventional ways of thinking and knowing. New ideas, personal expectations, initial impressions and interactions with others contribute to this sense of anticipation without providing clarity regarding what the final outcomes of undertaking the journey of academic study will be. Here it is voiced by a student:

> *In my mind it is going to add lots of value - it is going to change my life, but I cannot quite define it. I am not sure yet where it is going to go...*
>
> (Student 3, cohort 2)

Learning events fuelled comparisons with past experience and were measured against personal agendas to frame potential consequences of participation:

> *My drive for doing this course is purely from the point of view where I am in an environment where I am tending to specialise in one aspect of the field that I am in and I have always been very conscious of that-that I do not want to develop skills that belong to a niche. As far as my work environment, this* (the course) *will not in any way change my career development in the short term. In the long term possibly but now the field that I am in is still highly technical and not people management as such...so ...is difficult to maintain the performance, I need to force myself to give it 110%...you might not know what you are going to get out of it.*
>
> (Student 4, cohort 2)

This extract illustrates that learning events led to the expectation that a personal career agenda could be realised. The reasons for doing the course are motivated by a longer- term view of a career for which he wants to "learn something that is universal that I can use anywhere". The construal of events in this phase can also lead to anticipation of how learning in this context would be received in work contexts. In the example above, there is anticipation of some incompatibility between the learning context and the work environment as the work context at the time was perceived, in contrast to the course, as focussed on technical specialisation. Learning events were interpreted as confirming access to people management and interdisciplinary approaches rather than technical skills and discipline knowledge which was thought to characterise the work environment. This raised concerns that participation would require additional effort on the part of the students to maintain appropriate performance on the course.

According to Mezirow (1991), Bateson describes the expectations, premises, and presuppositions that people have as forming the contexts in which they learn. This phenomenon of *starting out* describes processes of context formation, i.e. interpretations as particular selections of events that could involve blocking out some aspects without recognition that these perceptions are partial (Mezirow, 1991).

In the excerpt below, the learning event leads to anticipation that particular attributes or abilities would be required of individuals to "accept" systems concepts:

> *... my first impression was that it was going to be a very right brain dominant class. I thought it would use a lot of lateral thought, these are new concepts that do not follow the logic lines and it would take somebody with right brain openness to accept these concepts.*

(Student 1, cohort 2)

Prior experiences are one input which individuals rely on for coping in new environments (Louis, 1980). According to Louis (1980), other inputs include personal characteristics, including predispositions, the individual's cultural assumptions or interpretive schemes and orienting purposes in the situation.

4.1.1 Systems ideas as catalyst

The novelty of systems ideas emerged as a catalyst in learning events in the *starting out* phase. Systems thinking was interpreted as offering a potential alternative to conventional ways of doing, seeing or thinking about things such as organisational problems:

> *I learned that it's difficult but you can actually break that problem solving analytical can't be done type of thing, and start to think with the right brain and think a bit more creatively.*

(Student 5, cohort 3)

Although an understanding of what systems thinking constituted was in the process of being constructed, the potential of the ideas and techniques were considered to be attractive and useful, warranting further exploration:

> *To see things systemically, from a broader perspective. I am not sure yet where it is going to go but this is where I am looking.*

(Student 3, cohort 2)

> *...it opens up your mind to looking around to bigger things and not getting caught up in what you are doing and where you are at that point in time"*

(Student 1, cohort 2)

The collective interpretations of learning events characterising the stage of *starting out* are therefore composed of context formation as framing experience based on expectations and initial judgements, and the novelty of systems ideas.

4.2 Phenomenon 2: Assimilation

Experiences which characterise *assimilation* involve a transition stage that includes contrasting past and present learning when making sense of learning events.

> *I do use tools and techniques, like what we learned here, CLD and all that but if you give me a choice on saying, "Do a thesis on using new tools, or the skills you have- I'll use my skills!"*
>
> (Student 3, cohort 3)

The learning event is construed as the acquisition of additional tools or knowledge from which to select without replacing what worked or how it was known before. In this phase, explanations of what events personally mean to students are characterised by trying out or experimentation, discerning what has value and relevance and the extent thereof:

> *I've always thought that a problem should be looked at holistically and I never understood systems thinking as a philosophy or system of management so it is not wildly surprising, everything, but it is still new. It is kind of contradictory but it just adds legitimacy to thought processes I think.*
>
> (Student 5, cohort 1)

The interpretations of learning at this time include *linking back*, where what is new is related to or used to build on prior knowledge, and *appropriating discourse*, using systems concepts and language to make sense of knowledge of the past and present.

4.2.1 Linking back

Linking back refers to the experience of content as 'hooks' for sense making. The example below illustrates this. The student describes herself as "more receptive" to learning an aspect of content because she could build on prior knowledge from an undergraduate degree:

> *Without that core knowledge the information would be difficult to relate and assimilate because it would not relate to anything. It is easier to absorb information when you have a core understanding.*

Yes, in general we all came in here with skills because we all have undergraduate degrees that make us think in a certain way and structure our thoughts and increase our rate of learning.

(Student 1, cohort 2)

Familiarity prompted assimilation as it increased the rate of learning and was sometimes associated with comfort, affirming what was known. Many of the examples that are incorporated into this phase demonstrate what Argyris and Schön (1980) call single loop learning, where the learning as change is *linked back* as a continuation of the paradigms that the student is accustomed to. Argyris and Schön (1980) credit the work of Gregory Bateson as informing their distinction between single and double loop learning. Bateson (1972) distinguishes four orders of learning and change, progressing from zero learning to learning level III. Using Bateson's theory to view the *assimilation* category of *linking back*, the Batesonian concept of Learning I, which describes learning through what Mezirow terms already established "meaning schemes," (1991, p. 90) is evident. Maintaining stable frames of reference as part of assimilating new knowledge is a characteristic of this category.

4.2.2 Appropriating discourse

Learning experiences were peppered with "new concepts", both in the language used to describe the experiences or interpreted as the consequence of learning. *Appropriating discourse* contributes to the phase of *assimilation* as there is recognition that, in learning the language itself, there is a cognitive process which identifies the concept as a cue to access other knowledge. In the example below, the student assimilates concepts learnt in his description of the experience of learning with a group:

So once you go up and down that ladder of inference it requires maturity and a bit of discipline to manage your mental models.

(Student 3, cohort 1)

In this category of the *assimilation* phase, the systems discourse is interpreted as providing a language that can extend frames of reference. This was found to involve a process of unlearning old concepts to learn new concepts:

...we were learning so many new concepts and it's the un-learning and re-learning that causes the tiredness.

(Student 2, cohort 2)

Gharajedaghi (2011) considers that we perceive the world as chaotic and complex due to the inadequacy of the concepts we have to explain it. In his view, the dominant language of our time, such as concepts from analytical science, only produces partial understanding while systems language

offers a holistic language "which will allow us to see through chaos and understand complexity" (Gharajedaghi, 2011, p.26). The learning of systems concepts is considered an important dimension of the propositional knowledge of systems thinking (Sterling, 2003). In the assimilation phase, making sense of systems thinking is primarily focussed on discrete systems concepts, ideas and techniques.

4.3 Phenomenon 3: Knowing the change

Learning events served as points of reference to describe those experiences which contributed to shifts or changes in thinking, in world-view, as self-development and in workplace practice. The construal of events revealed interpretations involving *engagement* with a range of ways of knowing, including knowledge as discrete units to be acquired from the expert, self- knowledge, knowledge as provisional, and the recognition by themselves as knowledge producer/generator. Types of knowledge produced included the following four kinds of knowledge:

- Knowledge perceived to be propositional, i.e. theory you must know or content knowledge;
- Epistemological knowledge e.g. basing claims on evidence;
- Practical or performative knowledge such as demonstrated in the use of applications such as how to draw a CLD; and
- Knowledge of self.

While the *assimilation* phase was characterised by the confirmation and extension of frames of reference, *knowing the change* is characterised by modification of previous frames of reference:

> *...it is difficult to pin point something and say there was a seed change after that point - I think gradually ...I have been shifting a lot of my paradigms, I have been shifting my mental models, the way I look at business, the way I look at people. In fact I was having a conversation with a colleague yesterday and I was discussing the fact that in business you tend to do things the way that we think they ought to be done because of all of this theory that we are taught in undergraduate level at university, I was just discussing these pictures with them and saying if I was to walk into most companies tomorrow and articulate a problem through a rich picture, the boss would probably say to me, "Don't show me comics, don't show me pictures, give me a 40 page report on what is the problem. I was just saying to him that is just the mental model that people have they'd rather have that 40 page report that properly doesn't tell them what is going on than a single picture that will tell them what is going on. That's the kind of - I think I would have been that person myself – before this course. I would have laughed if somebody had shown me a rich picture - I would have*

thought it was absolutely ridiculous because we just have those prejudices I think. Those are the changes that I have been slowly, gradually working on.

(Student 4, cohort 3)

Learning is represented in this phase as changes from previous ways of knowing which are described below as four categories, namely: *change in thinking*; *change in approach to problem solving; change as personal development*; and *change in worldview*.

4.3.1 Change in thinking

The recognition of habitual patterns of thinking and the interruption thereof emerged as a valued consequence of engaging with systems thinking. Change in thinking was interpreted as a consequence of participation in discrete activities or through reflection on the accumulative effect of participation in the course. In the example below, the learning log process provided evidence of cumulative change for the student:

...they (learning logs) *get you to focus on what you have learnt, and what value you had from learning that, the learning you know and how you see that being beneficial for you, so you can actually at a later stage go back and see your own development in terms of how your thinking has changed throughout the course, which is very important, I think ... to have that... now I definitely know I've learnt, cause this course involves so much thinking, and so much reflecting, and so much, you can actually lose yourself in it...*

(Student 4, cohort 2)

The significance of this change was that it could have the outcome of thinking or seeing things systemically. Thinking systemically was frequently associated with thinking holistically:

...It is a different way of thinking and also for me the biggest bit is that it opens up your mind to looking around to bigger things and not getting caught up in what you are doing and where you are at that point in time, to see things systemically, from a broader perspective...

(Student 2, cohort 2)

I tend to now think more holistically about problems. I keep on being given problems all the time but I now view them holistically I don't, cause I can see where things go wrong, where you start to look at things in isolation and then you actually fix the symptom and not the cause and it just comes back the next month or the next day or whatever.

(Student 5, cohort 3)

This association is echoed by Atwater and Pittman (2006) who list thinking holistically as one dimensions of systemic thinking. The other dimensions they note are: thinking dynamically, and thinking in terms of feedback loops.

Learning in Mezirow's terms would result in new or revised interpretations "of the meaning of one's experience in order to guide future action" (1991, p.12). According to Mezirow, (1991), if these new interpretations are not retained or remembered, this would be considered thinking and not learning. Understanding changes in thinking patterns as cognitive development (Merriam et al., 2007) introduces a relationship between systems thinking and cognitive development. Salner (1986) drew on the work of Perry (1970) and Kitchener (1983) when linking systems thinking with more complex cognitive development.

This process of revising the way things were thought about has the potential to inform action:

> *...so you've got these various tools that can assist one in actually thinking systemically and then by thinking systemically, achieve what is required in the workplace, required of you by the company.*
>
> (Student 4, cohort 1)

This link of thinking with action bears resemblance to the claim by Flyvbjerg, who draws on Foucault in claiming that "thought is the ability to think differently in order to act differently" (2001, p. 127). This phenomenon describes a change in thinking as a consequence of learning without making claims as to the permanency of this change or to the extent of the *change in thinking*.

4.3.2 Change in approach to problem solving

Learning experiences were expressed as the consequence of change in practice, primarily in how problems were approached and interventions addressed. Problem solving in this context does not only refer to direct solution-driven approaches. Reframing problems and a focus on situation improvement are also included in delineating this concept.

Qualitative differences in approaches are presented as two subcategories, namely, the *toolbox orientation* and *collaborative problem-solving strategies*.

Pragmatic selection from toolbox for application

The experiences of learning events were often described in terms of their utility. Terms such as "learning tools", "acquiring tools", "acquiring methods", "acquiring skills", "learning tools for use in the workplace", "use to achieve what is required by company", "useful to achieve workplace objectives", indicated that consequences of learning events included the acquisition of useful products that could be accumulated for real world application. This is represented using the toolbox metaphor.

The tools were conceived as including methods, concepts, techniques, models and processes which facilitated sense-making, learning about consequences before action, consequences through action and problem solving.

In the first example below, a causal loop diagram (CLD) was recognised as a structure for integrating data:

> *...The bits that we did with the causal loop diagram, that for me, I've been struggling with a problem that we've had recently or that I've been meant to deal with recently, and I think that's something that I would do, going to take all the data that I've collected, cause I'm sitting with all this data, and was kind of feeling just before this course, now what, what am I going to do with this data, suddenly like, I got a structure, ... I got something I can use to take this data, and use it, so yes, I do I think there is a lot of stuff, not only at that workplace, but at my own company as well, that we could use this sort of thing, ...*
>
> (Student 2, cohort 2)

> *... I had to apply the tools that we'd learned during the contact week and after that, so I think I've learned how to use those tools, so that in itself is sort of mastering or not mastering but understand those tools and how to use them...*
>
> (Student 6, cohort 3)

Course assignments as action learning provided structured approaches viewed as tools to guide thinking and practice as well as to enhance capacity for problem solving:

> *And in small wins – it was a good tool to learn, the process of thinking, a more structured approach to solving problems, so it was, I think that is what I got out of small wins – putting more structure in my approach as opposed to thinking of the implementation, thinking of this and going back to the problem and then going back to the cause. So this was a nice way to think, and to start my thinking process so in future projects or problems I can sort of use that same structure.*
>
> (Student 9, cohort 3)

Problem-solving processes, such as action research and learning, expanded students' toolboxes:

> *I think that the action research and learning systems is brilliant. I think it's quite a good tool to use in just about everything because I think often we dive into a problem, and we don't do any information gathering, we don't really reflect that much or I find that in a workplace*

people don't reflect and they don't gather information, they just bomb into the problem solving and they come out the other end not as rich as, as opposed to if they followed that process...

(Student 4, cohort 1)

In this example, the 'tool' is seen as having a broad range of applications, while others were filed in the toolbox to be retrieved for specific tasks.

Individual tools could also be combined to 'get' a methodology for later use in solving problems:

It was the CLDs and stuff introduced in that week, that contributed most to my learning, a new type of way of solving problems and getting your own problem solving methodology.

(Student 7, cohort 3)

Here the construal of learning events results in the recognition of the potential for performative knowledge as 'know-how', which is described by Mingers (2006) as the requisite skill and competence to be able to do something.

In taking an approach to the use of systems methods as "boxes of tools", Midgley (2000) warns of the potential for atheoretical application, with possible consequences such as short-term solutions and the inability to share a common theoretical language with others.

Collaborative problem solving strategies

Learning in the course could involve a shift to working with other organisational members in the workplace to collaboratively address problems or seek solutions:

...I learnt that if you co-create a solution it is far better than if you create a solution in isolation and try and implement it...

(Student 8, cohort 3)

Because they want to solve it, they are all in problem solving mode and that's not what I want, I want their ideas to come in so that you can create a whole different number of perspectives and then see from those perspectives which ones are actually going to deliver some solution to the problem. I'll look for out of all of those perspectives, which one out of those is the biggest lever… so I consciously actually apply that definitely withhold judgment and definitely advocacy and enquiry – don't, I don't go to meetings now with data, here's my data, let's talk about my data – you made 20 errors, look at these errors, I don't do that anymore. I used to do that... – I used to get all the evidence and the data and date and assemble all the days and start at the days instead of looking at the person, at the whole

person and saying, look this is what the outlook is, what do you think can be done to improve on this delivery?

(Student 5, cohort 3)

In this example the student, who is a senior manager, describes how he *develops* his role as facilitator of a collaborative process in contrast with previous approaches he adopted for addressing "errors".

Practical knowledge is an aspect of systems thinking which Sterling (2003) describes as relating to methodologies, methods, tools, and skills.

4.3.3 Change as personal development

Learning events created conditions for self-discovery and opportunities for personal development:

*I realised that through the process understanding how I communicate... sometimes I over illustrate things...or I have this very little inquiry in the way I engaged so people think that's the only perspective that I have. And suddenly standing back and say hang on I've got to present things in a less assertive manner because some people just think I am crazy. And the change has been so noticeable because people engage me a lot less aggressively because I am asking them what they think as opposed to me saying this is my opinion and leaving it there...*Lecturer C*... she forced me to ask questions on why I did things,...she asked questions in a general sense and forced me to ask them of myself.*

(Student 3, cohort 1)

The role of a catalyst, as learning event, in initiating *questioning* and *reflecting* strategies for self-improvement is illustrated in this example. *Feedback* from the actions of change can inform further adaptation. In the example above, the student moved beyond experimenting with new behaviour in a classroom setting and applied the learning in other contexts, indicating that such learning is not situation-specific. In contrast with the development of practice as a means to achieve objectives set by individuals in relation to work environments, personal development was often considered as unintended learning.

While students enter the programme with self-knowledge, -for example, knowledge of their temperament, knowledge of their learning preferences or, as illustrated in the quote below, knowledge of limited tolerance for ambiguity,- learning activities are construed as have the consequence of changing these, by providing opportunities for the recognition and change of undesirable behaviours. This change, as judged by the individual, includes improving self-awareness, improving self-knowledge, identifying and developing strengths or talents, growing their identity, and improving their ability to engage with others.

Perhaps it is my fault, my make-up is very structured. The first thing I look for in anything is structure. If there is no structure, because I have this mental frame and I populate areas for this, I populate the structure with various things and you must be really strong, or something must be strong to configure that structure, because that is my basis of negotiation and interaction.

(Student 4, cohort 3)

Church (1997) describes managerial self-awareness as "the ability to reflect on and assess one's own behaviours and skills as they are manifested in workplace interactions" (p.281). In a study of managerial self-awareness in high performing and average performing managers, Church concludes that higher performing managers were significantly more managerially self aware than managers with average performance. One could therefore conclude from such studies that self-awareness impacts upon effectiveness.

Sterling refers to personal knowledge as a critical aspect of systems thinking. In his view this involves "perception, awareness, intuition and values" (2003, p. 101).

4.3.4 Change in worldview

Worldview change in this context emerged as a concept that accounts for change beyond changing thinking. Change in world-view involves an interpretation of learning as involving *reframing* or a transformation in perspective. These findings illustrate that concepts and activities present opportunities for new meaning:

...It's a different way of looking at the world. I think once you look at something and particularly organisations from a systemic perspective, it's completely different, what I like about it is the way it takes away blame and talks about malfunctioning or substitutes malfunctioning and what's the cause. So for me that's hugely significant. And it also has a big impact on the way I would behave as a manager in the future.

(Student 1, cohort 1)

People with experience in the workplace have some knowledge or expertise for dealing with tasks or problem situations. Changes in worldview have the impact of transforming this knowledge by extending the scope of how something is known, or as Mezirow (1991) says, extending existing meaning perspectives.

I mean you take the concept used like a mental model, it is something completely new, it's your capacity to integrate new knowledge, ... the ability to integrate it into your, into your thinking.

(Student 3, cohort 2)

Kay (2002, p.526) describes a change to their worldview experienced by individuals' as "connoted by an expansion of their potential range of observed behaviours". He goes on the say that he or she must experience the new paradigms for themselves as propositional experience of the new paradigm, such as being told what mental models are, will be interpreted through the "old" ways of making sense (Kay, 2002, emphasis in the original).

4.4 Phenomenon 4: Integrating and adapting

This phase includes those interpretations of change as engaging with systemic practice. This is achieved as a methodological approach through the *integration* of tools and concepts, such as multiple perspectives and building shared models of the problem situation. This is demonstrated in the extract below that signals a difference in the way the problem would 'normally' have been approached:

> *... using the systemic tools that we were taught, instead of just doing it the normal way... so what I did was I approached it totally differently and the very first thing I did was I interviewed all the stakeholders, so that I could understand the whole picture... and the stakeholders had different perspectives of what they should be seeing. So I did the interviews and then I created a rich picture for the people that were actually producing the report and providing input to it. And that contextualized the whole thing in a different way for them...*
>
> *So I think that I learnt to consciously apply the system thinking tools and I learnt how to actually make value creations visible to the business people, which is why I think I learnt the most out of the practical application...*

(Student 5, cohort 3)

This phenomenon is aligned with Ulrich's (2003) approach of a discursive understanding of systems practice. Contrasting this with the model of expert-driven methodological applications, where the emphasis is on understanding and use of methodology, i.e. a problem-solving approach, he advocates that a discursive approach would focus on learning and solution questioning, driven by dialogue that requires substantiation of concerns and reasons in a way that is credible to all parties concerned.

> *In order to change and make improvements to a situational problem... in the old way of doing things you would look at the problem and you immediately jump to a conclusion, go into solution mode, implemented solution and think you've fixed the problem and then the problem comes back and then you do the exact same thing again. What this teaches you is that there is a more sustainable way of doing things and you have got plenty of choice for*

intervening actions. So it gives you choice of intervention, you haven't got a choice of one..., you can then see where the levers are and what they can be and what could be done and then you can choose to apply one, two or three of them, you don't have to just do one of them.

(Student 1, cohort 3)

The recognition of competence in using and applying systems techniques, tools and knowledge to practical problems, involves negotiating application, *adapting* to contextual constraints; combining skills such as personal skills, interpersonal skills in application, and knowing how to disaggregate the systems concepts, methods and methodologies for appropriate integration and adaptation. Disaggregating methodologies in this phenomenon includes remaining true to theoretical foundations.

What this teaches you is that there is a more sustainable way of doing things and you have got plenty of choice for intervening actions. So it gives you choice of intervention ... and it takes the people and personality component out of the problem...

(Student 2, cohort 3)

Although Ulrich credits the inspiration of his discursive shift in part to the "dialectical systems approach of Churchman" (2003, p.326), he distinguishes his views in this regard from that of Churchman by clearly associating his view of the 'systems idea' with seeking "*practicable forms of critique* rather than a heroic quest for comprehensive knowledge and understanding" (emphasis in text) (Ulrich, 2003, p.326).

Conclusion

The four phenomena presented in this chapter are distinguishable from one another by qualitative differences in the interpretation of learning events. This range of experience and interpretation can be seen as the consequence of a combination of conscious and non-conscious processes of assigning order and coherence to events. The phenomena are emergent findings and are presented and discussed in conjunction with the literature to illuminate the theoretical categories. The chapter that follows includes a discussion of phenomena which contributes the context and causes for the four phenomena presented in this chapter.

Chapter 5 Findings: Interpretive factors precipitating change

Introduction

In this chapter, phenomena are presented which provides the context and causes for the shifts between the interpretive phases in the evolving process of the learning of systems thinking. As with the previous chapter, the grounding of the abstracted phenomena is illustrated using selected verbatim quotes extracted from the interview transcripts. This narrative emerged during the theoretical coding process.

5.1 Phenomenon 5: Elements which mediate engagement

Components of learning events were construed as enhancing or inhibiting active engagement on the part of the student at a particular point in time. These were identified as including and extending beyond pedagogical practices which characterise or form part of the course design. Subjective components of contexts were construed as *mediating elements*, referring to components which could affect the quality of participation by students.

These components include the lecturer/ facilitator; outsiders (those external to the academic context, e.g. work colleagues); peers (classmates); learning artefacts e.g. assignments; physical activity; perceived alignment with past experience; content; and perceived relevance for future action. What caused something to be a *mediating element* was the recognition by the student that it contributed to discerning value in the event. These elements invoke movement from one phase to another by contributing to understanding; providing inspiration; identifying and revising erroneous presumptions; improving practice; changing thinking; and/or providing new ways of seeing the world.

5.1.1 Facilitation by others

The context created by the facilitator- whether they were perceived by the student as embodying the learning content, engaging students with their enthusiasm and style, or validating students' ideas, engaging students with their knowledge or facilitating an extension of the learning capacity of the student - was construed as influencing the quality of participation and learning of the student.

In the three extracts below, experiences were identified as learning events because of the facilitator's contribution:

> *...everything lecturer M taught me was absolutely new and it was stuff that I would tend to avoid because it's foreign to my interests and my ability and yet he managed to convey it in a way that actually engage people.*
>
> (Student 1, cohort 1)

The same student used an example of another lecturer, indicating that the facilitator's contribution "blew her mind" as the ideas he presented about systems, "makes so much sense... an appropriate way of describing the world". She described her experience of how the facilitator mediated learning:

> *It is just that lecturer B kind of exudes an enthusiasm for his topic that is very engaging, and there was a constant challenge from the minute he walked in the room until three weeks later probably of having to be awakened and focussed, couldn't afford to let my mind wander for a second because I would miss seventy- five pieces of really valuable information*.

(Student 1, cohort 1)

The passion or enthusiasm on the part of another lecturer for mediating learning was captured by a student who distinguished between lecturers who created a context for learning and those whose contribution could have been substituted, in the student's view, by a book and self-study:

> *...you want to understand because they love it so much, they love what they do, so you get captured in that enthusiasm... so that's what you choose to be part of...whereas the other one is just bored, so it's almost forced down your throat.*

(Student 3, cohort 1)

In addition to the facilitators' style and enthusiasm, participation and learning was encouraged by other means. In the extract below, the student had selected lecturer D's contribution as a learning event for the reason that the facilitator encouraged participation through the validation of the contribution that students can make. Baxter (-) Magolda and King (2004) note that in environments that promote self-authorship, as a principle of educational practice, the first principle was "validating learners' capacity to know" (p. 42). By validating prior knowledge lecturer D created a context for learning:

> *Interviewer: What was different between Lecturer D and Lecturer A?*
>
> *Nothing much, but they are different - they are both interactive but Lecturer A, he has an energy, though he puts the slides on there, it is not like his sessions will bore you because he has got the energy, he knows what he is talking about, so his energy it makes a little bit of a vibe but that's not my kind of learning. Lecturer D doesn't have that energy at all but his style, it makes you contribute to give out your ideas whatever it is, to be more involved, so that was the main difference.*

(Student 3, cohort 3)

As illustrated with these extracts, the conditions that contribute to students coming to recognise a facilitator as creating a context for learning differs between students. These contexts can bring students to awareness of their personal learning preferences and inform their decisions as to the extent of their engagement with the context. Coates (2007) describes student engagement as transient, influenced by time and context, rather than enduring types or traits.

While the facilitator may have a significant influence on the quality of participation, Kay (2002) is of the view that those who attempt to design these experiences need to be cognisant of the control the student has in the process. He describes the role of the facilitator as "attempting to assist the student develop a systemic worldview", who, "has only limited control of the environment within which the student has experiences" (Kay, 2002, p. 527).

5.1.2 Inhibitors

Physical and emotional dimensions impact on students' quality of participation in the course. The long hours, volume of work and time pressure affect their ability to concentrate. This impact upon student ability to assimilate, understand and participate fully in class activities has consequent negative impacts on mediating engagement. As stated by students:

> *if we had space...it would give people a chance to absorb more and reflect more,... I feel a bit insecure, what have I let go? Have I forgotten something important? Have I had the time to absorb this?*
>
> (Student 5, cohort 2).

> *my immediate contact week reaction is that it's so compressed that it takes a while to, to digest the stuff...*
>
> (Student 7, cohort 1).

A role designated to lecturers by students is to facilitate learning through providing interest and engagement. Thus the lecturers' styles were influential in students' interpretation of events as encouraging or not encouraging learning. This judgement was separated from the assessment of value the teaching content. This is illustrated in the example below:

> *we didn't really connect with the speaker and that he wasn't engaging enough and while everything that he said was of value and we actually wanted to, to learn from the material, we just, it, it was difficult to, to connect with the speaker.*
>
> (Student 2, cohort 2)

The same student (Student 2, cohort 2) relates different experiences in a later interview:

I found that these three lecturers drew heavily upon a person's ability to draw from personal experience, and thereby actually cementing the material in our minds, Lecturer C she gave a lot of examples and this allowed pre-thought to actually reflect and say, oh that happened to me, now I understand how that happened, Mr J to an extent as well, but he used real life examples where we can relate to human beings and their reactions, and it actually allowed us the freedom to think about personal experiences and to, to analyse to see whether this was the case and if it was dissimilar how it was dissimilar, so that cemented the information...

(Student 2, cohort 2)

A number of factors contribute to the student experience of a learning event as providing the conditions for learning. Students experience also revealed the potential of factors which constrained their development, for example, the concept of *shifting of control* to the students, in the intermodular assignments, was perceived by some as allowing discretion for preferences rather than judgement of what was appropriate to enhance their learning of concepts or contribution to organisational improvement. Focussing on these preferences had the potential for limiting the development of systemic thinking.

5.1.3 Coherence and integration of the elements of the learning environment

The correlations of learning events from the RepGrid analysis demonstrated clearly that some aspects of the course were interpreted as more coherent and integrated than others in terms of what was learnt and how learning was experienced. The process of eliciting the bipolar RepGrid constructs provided a platform for qualitative differentiations. These differentiations in student experience of coherence were made on the basis of the congruence between what was taught and the lecturer's knowledge and practice; learning orientation promoted by the learning event; control in learning; and what was learnt. Whether or not the elements of the learning environment were perceived as coherent and integrated had an effect on the students' emotional experience and consequently on their ability to gain the desired benefit from learning events immediately. In some cases the lack of a coherent experience was experienced as a dissonance that needed to be resolved through collective and individual agential strategies; in other cases it led to alienation from those events causing the dissonance. In the extract below, the student expressed an emotional response to a lecture which was intended to introduce the students to participant observation.

...Having started with the mindset wow, this was going to be fascinating, this stuff we are actually interested in...I found myself getting very frustrated and angry with the assumptions that it seemed to me that were made ... which comes down from a really top dog perspective that I found myself getting really angry...

(Student 1, cohort 1)

In this case, the source, i.e. the lecturer's view, was perceived as incongruent with what he was expected to teach. It was presented in a way which did not cohere with the student's expectations, based on her personal experience and experience of other learning events in the course.

In distinguishing between learning events, the student in the example below contrasts the style of presentations but considers that although her preference is for a more 'structured' style, the alternative is also necessary.

> *they have an easy to follow structure, there are guidelines which makes them easy to follow, you start at the beginning, these are the types of activities or thought processes or anything to that extent, it begins with these processes and it progresses... and this is the result ... there's actually a timeline or guideline, to which you can move, which builds upon your knowledge,*
>
> *you have more understanding at the end ... than what you had at the beginning, there is no set structure, there are no rules of where to start, how to start, it's, it's very subjective, I mean there are a great many tools that you can utilise...*
>
> *I think you need both – I do like structure, I respond well to structure... in this way it did come through as well it wasn't lacking in that it was just a more organic process.*
>
> (Student 2, cohort 3)

Although aspects of the course were perceived as weakly framed, these were not perceived as incoherent in this example. Framing, according to Bernstein (1990), "refers to the degree of control teacher and pupil possess over the selection, sequencing, pacing and evaluation of the knowledge transmitted and received in the pedagogical relationship" (p.88). Weak framing impacted upon other students when their experience of a learning event left them with the feeling that they did not know what was expected of them.

> *I am saying that if the weekly reflection is more directed, telling you to do something as a student rather than you having done something or supposedly have done something, or something has happened in your work place. Where it's a discretionary, the onus is on the student and it is a kind of discretionary type of thing, to say look you must, you've done now this couple of weeks of theory, how does this now live itself out in your practice, can you tell us on a weekly basis, what has happened. Where I would say do it the other way round ... but let's go for specific stuff and direct it or you can choose your menu as a student from the theoretical principles of concepts or any of the aspects that you have done in your management practice theory by saying, "Look in that 14 days, you Mr Manager, in your work environment, you must do one of these and write it up." I would prefer doing it that way, where it is a compulsion, more directed.*

(Student 4, cohort 3)

While the deliberate action of weak framing on the part of the course designers was intended to promote self-authorship, the lack of a coherent experience did not always have the desired consequences. This was perceived as a *shifting of control* to students. This appeared to contribute to the option of a lack of engagement at the levels of abstraction and complexity expected by the course facilitators, as the weaker framing of the assignments allowed a path of least resistance or discretion by the students for not engaging with areas they either had less preference for because of lack of understanding, time pressure or perceived lack of relevance.

When a context "bombards participants with contradictory demands" (Engeström, 2001, p. 138), opportunities are created for change and development. Salner (1986), Kegan (1994) and Baxter Magolda (1999) use epistemological arguments to account for experiences of uncertainty that enhance learning and change, as well as those that constrain learning and change. Salner (1986) makes the point that an epistemological 'climate' is established in every teaching situation that either moves students forward or reinforces their particular developmental position. While the use of an epistemological lens is useful for understanding student experience of uncertainty or lack of coherence, it does not account for the affective components of their experiences, such as anxiety. The emotional state of the student impacts on the quality of their experience and may "positively, neutrally or negatively affect the progression of the learning process" (Vermunt, 1996, p. 26). Therefore, the way students experience uncertainly can have the consequence of either contributing to progress through phases in the learning process or constraining progress.

5.2 Phenomenon 6: Individual characteristics and ability

As progress is made with learning and exposure to content and activities increases, students become more aware of the role of the contribution of their individual characteristics and abilities in the learning process. Although they become alert to the possibility of their role as an active participant in the *starting out* phase, during *assimilation* their efforts have a direct impact on the quality of their learning outcomes.

Readiness to engage in new experiences is a characteristic of individuals that describes the disposition of the individual for allowing new experiences or making themselves available to new experiences. Disposition is viewed as an active rather than passive dimension of this phenomenon, characterised by persistence and self-motivation. It could involve the suspension or revision of judgements in the face of evidence demonstrating desired consequences. For example, if an approach works in practice, the view of its value could change. However, a willingness to be open to trying it must be demonstrated:

I found I actually experienced a complete reversal of the thing. I think small wins is brilliant now, I think it is the only way to do anything to be quite honest. And that was quite funny for me actually, especially when I thought back on my first thought when we were introduced to small wins, this is rubbish this will never work. It is just brilliant the way…when I use that method at work. And when I actually sat down and thought about how we go about changing things at work and how it really doesn't work at all…it has got to be the only way to do things. So mean I was glad that I was forced to actually do the small wins because I got a lot out of that and if I hadn't been forced to do it I would have, I would just never have bothered because on the surface it seemed ridiculous. It goes against all the, the stuff that I'd been taught over years and years and years.

(Student 1, cohort 3).

This student revised his initial judgement that the approach in the course assignment would not work when engaging in experiential learning despite feeling 'forced' to do the assignment and seeing the approach as going against what he had been taught previously. Demonstrating *"*a preparedness to explore, to hold oneself out to new experiences*"* is described by Barnett (2009, p.433) as a disposition that coming-to-know may call for. Barnett (2009) uses the term *disposition* as an aspect of the human being that influences the process of someone coming to know. He argues that dispositions provide modes in which people take up intentional stances towards the world. In addition to a preparedness to explore, Barnett lists "a will to learn, a will to engage, a preparedness to listen" and "a determination to keep going forward*"*, as dispositions (2009, p.433). Fenwick explains that intention is the "attraction to particular objects of knowledge" (2001, p 20) that affects what students select and value as learning.

Brew (1993) claims that for learning from experience to be effective, we need to be open to opportunities for unlearning. Not only are students steeped in cultural and social norms, they have been exposed to different learning contexts, types and forms of knowledge, all of which informs how they interpret new experiences. By focusing on learning for a particular purpose, opportunities for learning may be missed. While Boud, Cohen and Walker (1993, p. 13) note that "openness to the possibility of learning from any event facilitates learning", Brookfield (1993) offers the reminder that private learning projects are culturally framed and are influenced by educational and political power. In the student quotation above, the control rested with the lecturer who deemed the assignment to be an appropriate academic activity. This control or power plausibly influences students' persistence and openness to learning from the experience.

Describing her learning in a lecture, the student below identifies her lack of motivation for applying the theory she has learnt. Recognising that the theory provided an opportunity to engage with

experiential learning to enhance her knowledge, she cited emotional elements acting as a constraint to application of the theory which she was not motivated to overcome:

> *I recognise that why I do it, I do not have any motivation to fix it.*
>
> (Student 1, cohort 2)

As noted in the discussion of the student experience of the coherence of the learning context, affective components of the experience of individual students, such as motivation, influence their ability to learn effectively. This contribution illustrates part of the story of what constitutes this phenomenon, as these dispositions, if viewed as having a temporal component, have the potential to be activated by learning events or be constrained by mechanisms in the learning environment.

Readiness to engage also offered opportunities for developing insights beyond what was provided in formal course lectures or readings and resulted in context-relevant knowledge:

> *...when I did it myself...the biggest thing, I mean it was a real light bulb moment, it was the realisation there's an incredibly large amount of emotions attached to any scenario planning exercise and it's not covered in any of the reading I have ever done... I learnt a great deal about how strategy is interpreted by difference groups of people...*
>
> (Student 3, cohort 1)

> *...see if what I applied if there is theory behind it, that can justify it or if there is theory behind it that can contradict it. I don't like always finding things that confirm what I've done, I like finding things where it is a contradiction and then I have a disagreement with that but then I still will apply that contradiction to see if that theory is correct or my theory is correct.*
>
> (Student 5, cohort 3)

Identity, dispositions, and hopes and desires are the outcomes of the way students have reconciled 'what matters' most (Wheelahan, 2007). These, Wheelahan (2007, p. 195) says, "emerge from the individual's engagement with and experience in the natural, practical and social worlds" and this "will shape their engagement with education".

5.3 Phenomenon 7: Group work as social pedagogy

Group work as pedagogy emerged as distinct from whole class teaching and refers to a relationship where people are arranged as a group or team for the purpose of engaging with particular activities, tasks or assignments. Group work as social pedagogy provides opportunities for shifts between

learning phases, particularly from the phase of *assimilation* to the *knowing the change* phase. The group has the potential to provide a common contextual experience for consolidating new knowledge, affirming doubts or moving forward. It also has the potential to be resource for self-managing learning by prompting student recognition of learning needs and using the group to address these needs. The dynamic of the group provides the influence or incentives for development. This recognition may come about by participation in the group, i.e. a social pedagogical process where the group interaction provides cues or triggers for the consolidation of understanding of concepts or content; understanding or scrutiny of personal world-views; reflexivity and/or access to other points of view.

5.3.1 Understanding and consolidating

While the *assimilation* phase reveals interpretations which draw on past experience to make sense of present experiences, *knowing change* encompasses interpretations of engagement with and adoption of new knowledge forms. The group interaction provides potential opportunities to facilitate this shift by contributing to consolidating and understanding. As one student notes when referring to assignments which required group interaction:

> *I find that ideas are consolidated when discussing it with other people, and you also learn different aspects of the content when discussing it with someone else... they'd make a comment or suggestion, it may be right or wrong or just the starting step, but it would assist me, and consolidated what I had...*
>
> (Student 2, cohort 2)

The role of small groups in contributing to students' understanding of course concepts in management education was noted by Michaelsen, Peterson and Sweet (2009). In this category of the phenomenon of *group work as social pedagogy*, the drive to enrich understanding through the group process is driven by the students as a social process, not the facilitator, as illustrated by the quotation above.

As students draw on group members to make sense of learning events, the composition of the group becomes important. In the response below, the student laments the consequences of the group not being well constituted, as evidenced by the lack of cues for understanding, illuminating flaws in reasoning, or opportunities for doing things differently:

> *…I must say I didn't enjoy this contact week as much as I did the first. There were a couple of days when it was just X and myself and I think we struggled a bit to get through the work and to build up this meaningful opinion of what was going on in some of the exercises. We just didn't have enough people to bounce ideas off...we were just chucking ideas at each other, we didn't really understand the ideas and were just agreeing with each other all the time. We*

weren't really picking up the flaws in our reasoning and spotting other opportunities for doing things in a different way. That was just for the first two days. I'd like to say that it did kind of set the tone...

(Student 1, cohort 3)

A student in Cohort 3 took the initiative to maintain regular contact with others in the cohort and to initiate meetings in the intermodular period to share information and to check their understanding of the work, of the three cohorts; this cohort achieved the best academic results of the research sample.

5.3.2 Facilitating and supporting reflexivity

Having access to other perspectives emerged as an important contribution of the group process. When these perspectives differed from students' own, it provided opportunities for reflection and modification of perspectives.

In an interview after module 1, a student describes participation in a group as giving access to the potential to modify his views or understanding:

Because it is so easy to have your own idea of what somebody is talking about and you know, the person sitting next to you can have a directly different opinion and sometimes you are completely wrong when you see what they come up with, you just quietly shelve your own understanding…

(Student 1, cohort 3)

In the next example, a student refers to the role of the group as generating ideas that trigger her own ideas:

The group work – there is much ideas that come from the group and those ideas don't come from you they come from other people but you can expound on those ideas... Some of the ideas will be fresh for you, you might not even think about them but someone else will think about them.

(Student 6, cohort 3)

Working in groups has been conceptualised in the literature in a number of ways: for example, as peer learning, co-operative learning and syndicates. Collier (1980) refers to small semi-independent groups as syndicate groups, while Boud (2001) defines peer learning as "students learning from and with each other in both formal and informal ways" (p.4). Blatchford, Kutnick, Baines and Galton (2003) propose that "group work is probably best suited to learning processes which involve giving up or transcending current levels of understanding to reach a new perspective, rather than learning

processes which involve the acquisition of new skills or strategies, or the individualism associated with practice-based tasks" (2003, p.162). Collier (1980) also makes reference to the potential of syndicate groups for developing higher order cognitive skills, noting that particular circumstances related to quality of outcomes; contextual factors; input, such as selection methods for syndicate membership; and group process factors, such as degree of persistence in understanding and modification of individual's views in discussion.

In the student's response below, group synergy is linked to quality of performance.

> *I found that when the group structure changed, our synergy was broken. ... So I think what I learned from this is that group synergy and innovation can be ...it can be very positive and create options and results quickly or it can be the opposite it can be very negative and you can end up spending a lot of time debating points which in the first group we had synergy, we didn't have to debate, we knew these things, there was like this mental linkage between the team and when the group changed everything changed. The whole dynamic changed of that group and we didn't come up with very good innovative group projects in my opinion after that...*
>
> (Student 4, cohort 3)

In this example, the student was concerned that the constitution of the group could impact negatively on the quality of performance in the group task. The way of working with others, in this case described as 'synergistically', rather than just working with others, could produce desired consequences.

The way that groups were constituted and worked together had positive and negative consequences. It provided access to ideas, contributed to performance outcomes, and facilitated understanding and revision of personal world-views. As the course design assumed effective group process in order to cope with the workload, work needed to be delegated amongst group members to support learning and to manage the volume of work: ineffective group process was therefore likely to impact on the performance of individuals. In the words of a student:

> *...that triangle, that synergy, time and quality of outcome I think is important in a team context and if you don't have the time you better have a lot of synergy and a lot of innovation because you are not going to make the time. If you've got a lot of time then you can create the synergy – can actually evolve it and you can create the innovative space. But when time was short, like on both of these, ja, I think you have to have a team that's got synergy or you are just not going to make it.*
>
> (Student 4, cohort 3)

In changing to knowing, the group process can be a resource that makes a qualitative difference to understanding, consolidating, facilitating reflexivity and modification of perspectives.

5.4 Phenomenon 8: Individual initiatives to advance learning

Individual students interpretations of learning events included descriptions of how they exercised agency in their learning. This involved identifying the need for adopting initiatives and acting in their own interests to acknowledge and attempt to resolve discomfort associated with learning or to enhance understanding. Exercising autonomy in relation to their learning involved an approach of selecting from 1) prior or intrinsic strategies, i.e. the context the student brings with them, and therefore not specific to the pedagogical context or 2) context-directed or extrinsic strategies or opportunities provided through other learning events in the programme.

5.4.1 Prior initiatives

In the case of prior initiatives i.e. those that were not directed or proposed through the course activities; they were discovered as activities such as reading, use of mind maps, and asking others. These came from prior use, e.g. prior learning or from life experience. This emerged from students' statements such as:

> *I try and figure it out, and try and figure it out and try and figure it out. Then when I feel that I am not getting anywhere especially if time is critical, then I'd rather talk to someone that I am comfortable with and who would probably know the answer to it and be able to clarify but I know myself, I would probably go to that person after I've absolutely exhausted and I cannot think of any possible other solution...*
>
> (Student 6, cohort 3)

This statement indicates that although the student prefers a self-reliant approach when she has difficult in understanding, there were conditions such as time pressure which caused her to adopt other strategies such as identifying someone who would know and approaching them for assistance. These were both peers on the course or facilitators. Although this student indicated that this was her preferred strategy, and called it a "normal scenario", the course activities such as teamwork provided an alternative, "...because with a team you can't just think about things in your own head, you have to tell them what you are thinking... it was much easier to pick their brains as well" (Student 6, cohort 3).

Another student took responsibility for engaging in order to keep up with the volume of work and the pace at which it was delivered.

...the stress of the amount of work and also the pace of lecturers, you're forced to listen, because if you don't, you get behind, so I think my learning's come from that...

(Student 5, cohort 1)

In the transcript excerpt below, the student relates his approach after he failed to solve a work-based problem to his satisfaction in an academic assignment. Although concepts from the course provided the means to enable learning, the initiative was derived from prior strategies:

...the strategy was around solving the problem; the other strategy was for me to actually learn and grow in the process as well and to actually start practicing some of the systemic practices like advocacy, enquiry, withholding judgment, creating collaborative work spaces... So I consciously did some additional research, I started to read the Fieldbook, the discipline field book, to see if I could get more theory and I did some web based research which uncovered quite a lot of stuff...

(Student 5, cohort 3)

In a pedagogical context, the same student uses the strategy of undertaking his own research for understanding in response to a lecture which he stated he had not learnt from:

I think it was that lecture, the lecturer just rushed through it for some odd reason; there was no time for questioning or dwelling on points or elaboration. So I really lost the plot. I just didn't know what the context of that lecture was about. I still can't actually remember what it was about. ... I did my own research on that and found it quite useful, the different archetypes.

(Student 5, cohort 3)

5.4.2 Context directed initiatives

The extrinsic or context-directed initiatives were those initiatives that were introduced in the course or formed part of the learning activities that were interpreted as learning events by students when they compensated for not having understood the work. These included metacognitive activities, such as reflection e.g. use of the learning log and critical incidents; self-monitoring or self-evaluation; and social strategies, such as collaborating with other group members in the learning environment and taking up the expressed opportunity to use the facilitator as a resource:

And I think that one thing that ensures you do use all the learning's on a regular basis is the weekly reflection... it was the most powerful tool that we had.

Interviewer: What do you think you learnt from it?

Well, I think that I learnt that you have to reflect. I mean it is pointless, you can accumulate all of the knowledge in the world, all of the data, but if you don't actually, if you are not actually mindful, if you are not conscious of that knowledge, and you don't apply it, then it is actually a bit of a waste.

(Student 1, cohort 3)

Completing the course assignments that offer opportunities for learning did not mean that students leveraged these opportunities for the purpose of learning from them. When assignments were engaged with for the purpose of learning from them, these become context-directed agential initiatives.

Bhaskar (1998) advocates three criteria for rational agency, including the possession of "knowledge to act on one's own real interests (the cognitive requirement)"; the ability to "access the skill resources and opportunities to do so (the empowered component)"; and the impetus to "be disposed to so act (the dispositional or motivational condition)" (1998, p. 661). By engaging with context-directed initiatives for the purpose of meaningful learning, students demonstrate agency. A meaningful orientation to learning has been described by Korhonen (2004) as learning intentions geared towards understanding and application. Korhonen (2004) contrasts this with an accommodative orientation of learning seen as geared towards the fulfilment of external requirements. These orientations are described by Korhonen (2004) as contextual orientation to describe learners' qualitatively different ways of experiencing, interpreting and metacognitively managing in the learning environment.

5.5 Phenomenon 9: Context of application

The work-based assignments extended the context for learning beyond the classroom and assignments conducted in their work contexts appeared frequently as learning events. This phenomenon describes the effects on student learning of enablers and constraints in their application of the coursework. Applications of what they had learnt on the course enabled their practice. These were selected by students as particularly valuable learning events. Application in the workplace facilitated learning and had the potential for providing affirmation of what the student had learnt.

5.5.1 Seeking support

The culture of the organisation in which the student worked was interpreted as influencing the success of students' experiential learning. *Seeking support* in the context of application involves the recognition of anticipated resistance to systems ideas and was thus perceived as potential constraints posed on students' ability to apply systems concepts in their work environments. These constraints were interpreted primarily as related to the systems discourse not being shared by those with whom they worked. This is illustrated in the example below:

In the work context no-one had any of this theoretical background that I worked with. Not one of them had ever been on any of this kind of systemic thinking courses.

(Student 5, cohort 2)

This perceived lack of support created a separation between new thought and practices and the thinking and practices prevalent in the organisations in which students worked. For example, systems ideas were considered to not have currency in an organisation where work colleagues were focussed on "outcomes":

"*I would like them to do this, because I do not want to go and battle with my new train of thought in an environment that does not encourage it*".

(Student 5, cohort 2).

This difference between a state of thinking and experience characterised by the course versus that which characterises students' work environments is described in the extract below as a difference in theoretical background, in other words, students doing the course know something different from that of their work colleagues.

Because the big difference in the work environment that I found is that with the people on the course with you, they are all at the same level of learning as you. So you immediately have a synergy because you are all on the same wavelength and you all have that same theoretical background.

(Student 5, cohort 3)

This was construed as having the potential consequence of impacting on students' ability to leverage the work environment for learning. While the work environment had the potential to constrain applications of work-based assignments, the functional roles and status of students in their organisations also had the potential to enhance the ability of the student to fulfil the requirements of the work-based assignments.

Conclusion

The five phenomena presented in this chapter reveal the role of contextual circumstances and learners' personal projects in the learning process. These findings indicate that the context has an influence on how students' experience and perform in the coursework. In addition, those elements that were interpreted as impacting on student involvement in their learning are identified as phenomena. This affirms the relational nature of the teaching and learning experience.

In chapter 6, additional literature is drawn upon to support the theoretical ideas developed from the empirical results presented in chapters 4 and 5. The chapter concludes with comment on other studies undertaken in the area of teaching and the learning of systems thinking.

Chapter 6 Literature review

"…all programmes designed to act as catalysts for personal and professional growth and change contain explicit theorisations concerning the nature of the self, its development or capacity for change, and the way self relates to others or to society more generally."

(Chappell, Rhodes, Solomon, Tennant & Yates, 2003, p.9).

Introduction

In the absence of a well-established body of literature on the development of systems thinking in mature management students, a broad range of topics related to learning and development were drawn upon. In the first section of this chapter, adult learning is mapped out as a broad conceptual area as both social and personal aspects of learning emerged from the grounded theory analysis. Selected topics, such as constructivist learning, development and self-directed learning, as well as the importance of context in learning are treated to further discussion, based on their relevance to the course design and theoretical propositions emerging from the analysis.

In the second section of this chapter, the contributions of several studies pertinent to teaching and the learning of systems thinking are acknowledged and commented upon.

6.1 Perspectives on learning and development in adults

> *"To move to a richer understanding of learning in adulthood, we suggest that adult educators use multiple lenses or perspectives on development instead of relying on a single paradigm of development".*

(Merriam, Caffarella & Baumgartner , 2007, p.272).

Understanding how people learn is central to the design and management of educational programmes. The quotation from Chappell et al. (2003) at the beginning of this chapter proposes that education as a catalyst for personal and professional growth is informed by theoretical assumptions "concerning the nature of self, its development or capacity for change and the way self relates to others and society more generally" (Chapell et al., 2003, p.9). These assumptions are usually implicit and should of necessity be articulated to conceive of self-change, as argued by Chapell et al. (2003). Atherton (2005), in his comprehensive summary of theories of learning for adult, professional and higher education, distinguishes between learning and theories of learning. As the discussion of all definitions of learning and learning theories is beyond the scope of this thesis, a summary of adult learning theories can be found in Appendix A2: Adult learning theories and definitions, for reference and comparison with those discussed here.

As with many dynamic domains of research, the term *learning* has taken on many uses and meanings depending on the context, the paradigm used, and the purpose of the research. In selecting theory relevant to the understanding of adult learning in this study, the assumptions linking them are explained here:

1. Adult learning is understood to take place in a number of contexts, i.e. through involvement in community; home and family activity; everyday workplace tasks and interactions; and at other sites which do not necessarily form part of formal education [see, for example, Fenwick (2001), Boud & Solomon (2003) and Thomas & Harri-Augstein (1985)]. Although they will not be discussed here in detail, concepts such as lifelong learning, learning organisations, situated learning theories and recognition of prior learning, amongst others, all acknowledge the idea that learning is not the exclusive privilege of formal classroom settings. Thomas and Harri-Augstein (1985) present a view that "living is always an opportunity for learning; but how people use it depends upon what they bring to each event and what they make of each experience" (p.xxii).

2. Adults have the ability to develop and change (see, for example, Mezirow, 1991; and Kegan, 1994).

Fenwick, who has written extensively in the area of adult and workplace learning, describes a trajectory of how learning has been characterised (Fenwick, 2008), moving from the acquisition metaphors of the 1980s to emerging characterisations which include complexity theory perspectives. In this section, Fenwick's framework is used to identify broad clusters of perspectives on learning as distinguished by their epistemological assumptions. The characterisations are mirrored in research on learning in formal contexts (e.g. Allie et al., 2009) and are described briefly below:

1. Drawing on positivist assumptions, *learning as acquisition* presents a view that individuals acquire and store new concepts, skills and behaviours, acquiring them from their sources and placing them in the learner's head (Fenwick, 2008). This represents a view of learning which focuses on agency or the individual acquiring defined units of knowledge.

2. Constructivist notions of *learning as sense-making* is characterised by concepts such as reflective practice, self-directed learning, transformative learning, and learning style. Unlike acquisition, individuals interpret and make personal meanings of learning experiences. Although the focus is still on the individual, knowledge is interpreted and units of knowledge therefore differ between individuals who may participate in the same environment or experience.

3. In social theories of learning such as the concept of *communities of practice*, widely accredited to Etienne Wenger (1998), *learning* is viewed both *as a participation* in everyday activity within a community and as the process of engaging in practices and emerging knowledge embodied in the specific action of a particular community (Fenwick, 2008).

Theories of learning answer the question of how we expect people to learn. Knowles (1990) reminds us that in designing educational activities, decisions about content, teaching styles, time, place and assessment are informed by some idea of what will work best, whether we consciously articulate them or not.

Management learning may not constitute a separate discourse from adult learning but can be separated because of the context interest for particular audiences (e.g. management educators, management researchers, organisational consultants). In addition, there is general agreement that the environment in which people manage is characterised by frequent change, as noted in the introduction to this thesis. Therefore, in Ackoff's words, "managers are not confronted with separate problems but with situations that consist of complex systems of strongly interacting problems" (Ackoff, 1994, p.211). This may direct a researcher to particular definitions of learning and particular learning theories.

In Appendix A2 a summary of adult learning theories and models from a synthesis of a number of literature sources is provided. The theories which are central to this thesis draw on constructivist assumptions and are discussed in more detail below.

6.1.1 Constructivist learning approaches

Experiential learning

In this study the learning theory informing the assumptions of student learning in the design of the Systems Practice course includes a constructivist approach to experiential learning. Since part of the intention of this study is to understand how students experience the course, an explanation of the theoretical construct of experiential learning can inform the study of this experience.

Although Dewey, the pragmatist philosopher, is often credited with identifying the idea of experiential learning, Kolb (1984) has since become associated with the term. Kolb (1984) conceptualised the process of experience and adaptation to the world which is often presented in literature as a stripped down version of a learning cycle (Reynolds, 1998). This cycle includes four stages which include 1) a concrete experience; which is followed by 2) reflective observation on the experience; 3) abstract conceptualisation involving the formulation of concepts to explain the experience; and 4) active experimentation, i.e. putting the explanation into practice. The cycle is illustrated in Figure 6.1. Kolb developed an instrument, the Learning Styles Inventory, for testing and

applying the theory. This cycle has since been adapted by a number of authors, including Bawden, (1997) whose contribution will be expanded on later in this chapter.

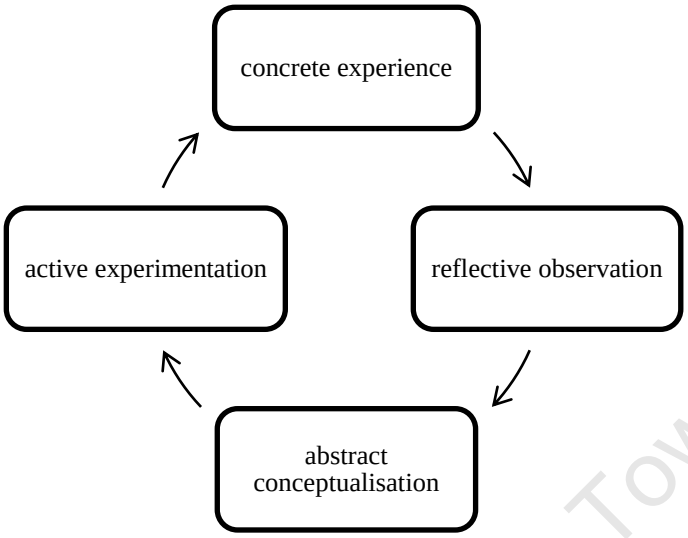


Figure 6.1 Kolb's learning cycle

Experiential learning has been a significant area of research for learning and practice in the education of adults, as well as practice in management education and development. Fenwick (2001) describes the term *experiential learning in adult education* as being associated with those theories and practices which are based on reflection on concrete experiences. The activity of reflection therefore locates experiential learning as a "process of human cognition" (Fenwick, 2001, p.1). The overview of experiential learning provided by Fenwick aims to theorise the "intersection between situation, educator, and subject whose position is designated *learner* by virtue of a traceable developmental moment" (Fenwick, 2001, p.2).

Although Merriam et al. (2007) state that adult educators have accepted a relationship between learning and experience, they observed that we are still learning about how this relationship works. They raise the question of what the best ways are to design "learning episodes to capture this experiential component" (Merriam et al., 2007, p.161). In attempting to answer the question, they propose reflective practice as one of the ways in which educators can provide opportunities for learning from experience. Reynolds (1998) emphasises that experiential learning, as derived from the ideas of Kolb (1984) and Schön (1983), is dominant in management development as it reinstates *natural* learning as opposed to institutionalised learning.

Fenwick (2001) draws on a broad range of adult learning literature to provide useful categories of perspectives on experiential learning. She presents *constructivism* as the dominant perspective with four alternate perspectives, namely: psychoanalytic, a situated perspective, critical cultural and

enactivism. These theorise different relationships between the "knower and context, between learning and action, between mind and learning, and between educator and the process of learning" (Fenwick, 2001, p.28). Fenwick raises the important question which she suggests should be put to each of these experiential learning perspectives, namely: "How is the one doing the experiencing being understood?" (2001, p.28).

Each perspective provides detailed arguments explaining experience as learning. A very brief explanation of each will be included here for comparative purposes. Psychoanalytic theory emphasises the personal aspects of the learner. The one doing the experiencing is seen as having an unconscious internal world, such as their desires, which *interfere* with the conscious perception of experience. Learning is characterised by individuals working through their conflicting desires.

Situated perspectives, drawing primarily on the work of Lave and Wenger (1991), privilege the role of the particular situation in knowing and understanding, i.e. the combination of the community (with its inherent history, culture, values, norms and patterns of relationships), tools (including models, technology, images and language) and the activity in that moment (Fenwick, 2001). Enactivism, which draws primarily on the work of Maturana and Varela (1987), and Davis and Sumara (1997), considers that cognition and environment become "*simultaneously enacted* through experiential learning" (emphasis in text) (Fenwick, 2001, p.47). Fenwick acknowledges the similarity between situated perspectives and enactivism, identifying it as the integration of the environment with cognition. She also points out that the primary differences arise from the disciplinary origins of each perspective. While situated cognition has its origins in psychology, enactivism developed from evolutionary biology. In situated cognition, the individual learns through participation when individual and context are integrated. The individual and the context are considered as separate entities requiring participation for learning. In enactivism the learning process involves coemergence, with the person and context melding together as a system. Learning can come about as a continuous process of invention and exploration (Fenwick, 2001) produced through the relations of a variety of components such as "consciousness, identity, action and interaction, objects and structural dynamics of complex systems" (Fenwick, 2001, p.48). This systems view of learning moves the focus from the components of the experience (such as the person, experience, tools, community and activity) to the relationships linking them together (Fenwick, 2001).

Critical cultural perspectives locates the one doing the experiencing within a context where the influence of power is seen as impacting on what is learned, and the value of what is learned. The cultural space in which learning is located is said to be "shaped by the *discourses and their semiotics* (the signs, codes, and texts) that are most visible and accorded the most authority by different groups" [emphasis in text] (Fenwick, p.40). Learning involves an awareness of these influences.

Fenwick concludes with the observation that the use of distinct categories of learning "masks the differential influence each wields on adult education practice, social theory, and on each other." (Fenwick, 2001, p.52).

Adult experiential learning is not without its detractors. It has been particularly criticised for its many interpretations and fragmented theoretical and philosophical foundations (Malinen, 2000). In her review of a range of experiential learning theories Fenwick (2001) compiled criticisms of these as follows:

1. The limitations of conceptualising "reflection" as a cognitive activity;
2. The view of experience as something concrete to reflect upon;
3. The separation of the individual from the context of learning;
4. The notion of the individual reflecting rationally as unitary self; and
5. The managing role of educators which has shifted from the original intention of honouring individuals' experience to squeezing said experience into preset categories.

Reynolds (1998), in an argument advocating that managers reflect critically in a way that examines social and political processes in order to surface concealed interest and ideologies, critiques reflection in experiential learning as limited, due to the individualised approach promoted by the theory.

Bawden (1991) extended our understanding of models of experiential learning as a result of collaborative efforts at the Centre for Systemic Development, Hawkesbury, Australia. The impetus for the development of this model was what Bawden expressed as the inadequacy of prevailing models in the face of the complexities and dynamics of the contemporary world. The model of the learning process is presented as central to systemic development. This work has resulted in the adaptation of the experiential learning cycle to a lemniscate that integrates experiential and what Bawden describes as *inspirational* learning. Bawden distinguishes between the two, noting that *experiential* learning is knowing an event, person or thing in direct interaction, while *inspirational* learning constitutes knowledge acquired in non-rational ways, calling this knowledge for *judgement*.

The model represents a significant departure from other conceptual models of experiential learning theory and explicitly incorporates cognitive, emotional and social dimensions. Points of relevance are identified below and elaborated upon in Table 6.1.

1. Learning is represented as a systemic process which includes systems concepts such as feedback and emergence as part of understanding the learning process.

2. Learning is a social activity: this can be referred back to the criticisms raised above, 1) reflection is not seen solely as an individual cognitive activity as groups organised as a learning system participate in feedback and reflection, and 2) awareness of the influence of context in terms of power and other factors.

3. Ontological and epistemological assumptions are identified for systemic competence: the role of educators is to facilitate awareness of assumptions, whereas, for the individual and the learning system the role is to judge their experiences.

4. Instead of a linear cyclic process, have learners recursive relationships.

5. Focuses on two types of learning, i.e. experiential and inspirational learning.

In this model, groups of learners establish critical learning systems which, in addition to acknowledging learning as a social activity, describe learning as systemic. This system of learning integrates activities in three different domains: sensual, spiritual and conceptual (illustrated in Figure 6.2):

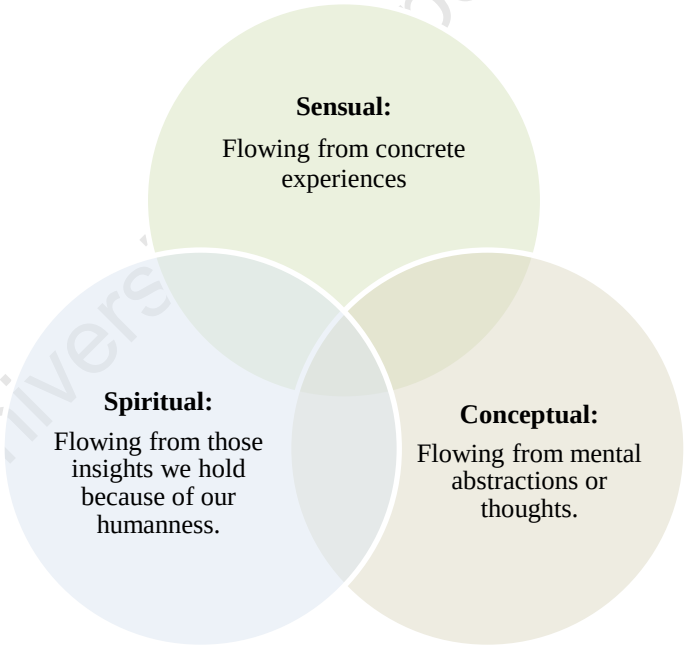


Figure 6.2 Domains of critical learning system (adapted from Bawden, 1997)

The experiential learning component of Bawden's model has elements from the sensual and conceptual domains, while the inspirational cycle incorporates elements of the conceptual and spiritual domains. The experiential learning components in this model assume three tiers of learning which not only consider 1) learning from experience but also 2) meta learning as a reflexive process and 3) epistemic learning which involves transformation of perspectives. These three cognitive levels

of the experiential sub-system in Bawden's model can be distinguished by the questions as shown in Table 6.1 (Bawden, 1997).

Table 6.1 Levels and questions distinguishing subsystems of a critical learning system (adapted from Bawden, 1997)

Learning	Meta learning	Epistemic learning
What are you experiencing in the situation about you?	How are you making your observations?	What world-views are your observations revealing?
What sense are you making out of what you are observing?	How are you going about the process of making sense?	What key assumptions are underlying your interpretations?
What actions are you planning to change the situation?	How are you going about the process of planning change?	How are you challenging the key assumptions you hold?
What are you doing to change the situation?	What is the nature of the actions you are taking?	What are you doing about changing your assumptions?

While it has become commonplace to include structured social engagement in academic programmes in the form of group work and workshops, few have the conceptual framework conceived by Bawden (1991). Bawden explicitly considers ontological and epistemological theorising of these interactions. Those models of group work as a skill or those which focus on self-disclosure and analysis of personal experience, are devoid of social explanation (Reynolds,1998).

Transformative learning

While there are different lenses with which to examine transformative learning (Merriam et al., 2007), the work of Jack Mezirow has resulted in the conception of a theory of adult learning which has appeal for research and practice in management education and learning. Not all learning is transformative (Mezirow, 1991). When learning transforms, there is either change in our beliefs or attitudes, what Mezirow calls a *meaning scheme*, or our entire perspective can be transformed, which Mezirow refers to as *habit of mind* (Mezirow, 2000). The four main components of Mezirow's theory of transformative learning are: experience, critical reflection, reflective discourse and action (Merriam et al., 2007), which Mezirow breaks up into ten steps or stages starting with a disorientating dilemma (see Mezirow, 1991). According to Mezirow, every act of learning involves interpretation. Learning in Mezirow's terms would result in new or revised interpretations "of the meaning of one's experience in order to guide future action" (1991, p.12), where action involves praxis, which he describes as "the creative implementation of a purpose" (Mezirow, 1991, p.12). Learning would therefore result in a different response to external change and diversity. If these new interpretations are not retained or remembered, this would be considered thinking and not learning (Mezirow, 1991).

The concept of changing meaning schemes and meaning perspectives is significant in management education. Postgraduate management education classrooms, as well as organisations in general, are composed of diverse participants, for example, in terms of race, discipline, age, life experience and sexual orientation. Consequently, opportunities could be created for the revision of a range of assumptions and stereotypical views. This creates an opportunity for viewing the class as a subset of society which could be transferred to work contexts. It also promises changes of habitual expectations, making it possible for managers to view and respond to problems differently.

Mezirow (1991) credits the contribution of the idea of transformations in learning to Gregory Bateson (1972) and the division of reflective learning into *transsituational* (learning to change how we interpret a situation) and *transcendent* (learning to modify or create new concepts for interpreting individual situations) to Edward Cell (1984). These models share an emphasis on reflection as the means to critique and reassess what we know, as well as an emphasis on change in learning, presenting the changes in a desirable and positive light. A brief overview of each of these theories is included in Table 6.2.

Table 6.2 Comparison of three learning theories (adapted from Mezirow, 1991)

	Cell (1984)	**Bateson (1972)**	**Mezirow (1991)**
	Levels of change	*Categories of learning*	*Transformational learning*
1	Response learning: Change habitual responses by adding new responses or substituting new for old; includes rote learning	Zero learning: Extending pre-existing habitual responses to cover additional facts	Learning through existing meaning schemes, similar to response learning; working within previously acquired meaning schemes
2	Situation learning: Change in the way situations are interpreted and judging how things work in a situation	Learning I: Learning about our own habitual responses, i.e. learning through already established "meaning schemes", includes thoughtful action	Learning new meaning schemes: Extending the scope of existing meaning perspectives
3	Transsituational learning: Learning how to interpret our acts of interpretation	Learning II: Involves change in the premises upon which we learn i.e. "corrective change in the set of alternatives from	Learning through transformation of meaning schemes

		which choice is made" (p.293).	
4	Transcendent Learning: Creation of new ways for interpreting situations, i.e. combination of the changes in each of the previous levels	Learning III: Involves perspective transformation, i.e. change in the frame of reference which informs the premises of Learning II	Learning through transformation of meaning perspectives.

In transformational theory, Mezirow (1990) identifies three forms of reflection for transforming meaning structures: these include content, process and premise reflection. These all involve conscious engagement with our beliefs and either confirming or identifying them as a problem and transforming them. Premise reflection is the means by which our meaning perspectives or belief systems become transformed.

Merriam (2004) argues that the critical reflection and rational discourse required for transformational learning is not available to all. The ability to reflect critically on your own assumptions, as well as those of others, requires according to Merriam (2004), advanced levels of cognitive development. Mature cognitive development is characterised by being able to "examine alternative perspectives, withhold premature judgment, and basically to think dialectically" Merriam (2004, p. 61).

In Taylor's (1997) review of empirical studies using Mezirow's learning theory he observed that most studies concurred with the significance of reflection in transformative studies. However, he also references other studies which found perspective transformation to occur without a process of critical reflection. Findings from these studies acknowledge the role of factors which are not considered to be rationally-based, such as intuition, other ways of knowing and empathy, i.e. "a variety of non-rational and unconscious modalities for revising meaning structures" (Taylor, 1997, p.8). Taylor argues for a more holistic view of transformational learning in adults, which is grounded in context. In this regard, he identifies four factors as significant in the process of perspective transformation, namely affective learning, non-conscious learning, relationships and the collective unconscious.

Bawden's model presented earlier acknowledges the possibility of affective, spiritual factors in learning. Taylor's focus on the role of relationships in critical reflection is also an area that overlaps with Bawden's model.

In the context of management education and learning, reflection plays a key role in pedagogical practices. Concepts such as mindfulness, reflective practice, critical thinking, personal mastery and others, imply a conscious awareness of focusing on features of the learning experience to achieve a specific aim. As the means to bring about change in learning, structuring reflective exercises in

management learning assumes that desirable components of the learning experience will be brought into focal awareness, e.g. learning the role of systems archetypes in systems analysis. Although this approach may appear to privilege logical, rational approaches to reflection, a holistic view that draws in affective factors and the participation of others is assumed to be part of the learning process.

6.1.2 Development and self-directed learning

Merriam et al. (2007) distinguishes between adult development and cognitive development in adulthood in their book, *Learning in adulthood: a comprehensive guide*. While a brief summary of adult development perspectives is provided in Table 6.3, the focus in this section will be primarily on cognitive development in adults (Table 6.4), that is "how thinking patterns change over time" (Merriam et al., 2007, p.325), i.e. the content of the change discussed in the previous section. This choice is informed by two factors:

1. Conceptualising learning as a constructivist process within a critical realist understanding of reality; and
2. Arguments that systems thinking is associated with more complex thinking and with contextual relativism.

The motivation for critical realism as an ontology was considered in more detail in Chapter 2.

Table 6.3 Four perspectives of adult development (adapted from Merriam et al., 2007)

<table>
<tr><th colspan="4">Perspectives of adult development</th></tr>
<tr><th>Biological</th><th colspan="2">Psychological</th><th>Sociocultural</th><th>Integrative</th></tr>
<tr><td rowspan="2">Individual focus related to physical and biological effects of aging. Aging is generally associated with negative impact on learning e.g. sensory and brain function.</td><td colspan="2">Individual focus</td><td rowspan="2">Considers impact of historical context, including class, race, socioeconomic status, sexual orientation and gender.</td><td rowspan="2">Combines different influences to account for development.</td></tr>
<tr><td>Stage-related e.g. Erikson's psychosocial model.</td><td>Age-related e.g. Levison's model where development period correlate with chronological age.</td></tr>
</table>

Cognitive development in adults

The cognitive-developmental learning theories which are discussed in this section were drawn on for their contribution to understanding conceptual shifts, how adult learners make sense of their

environments and the variations and similarities between individuals' perception of their learning experiences. Table 6.4 depicts categories of these theories. The theories all focus on individual development, but do include significant differences which are revealed from the authors' reviews of their own work and from critiques by similar theorists.

Table 6.4 Cognitive development models

	Linear and categorical models	**Dialectical**	**Contextual**
Definition	Qualitative development of cognition progressing from less to more complex development stages.	Acceptance of inherent contradictions and ambiguities in thought processes (Merriam et al., 2007).	Aspects of the social, political, economic and cultural contexts shape cognitive development in adults.
Theorists and examples	Piaget: Not focussed on adults but informed later adult development models. Perry (1970): Developmental scheme. King and Kitchener (2004): The Reflective Judgement model. Belenky, Clinchy, Goldberger, and Tarule (1986): Women's ways of knowing. Baxter Magolda (1992, 1999): Epistemological Reflection model.	Basseches (1984) Kegan (1994)	Labouvie-Vief (1990) Goldberger (1996)

Although Piaget is most well known for his work on childhood cognitive development, he was influential in providing a foundation for work in adult learning. Perry (1970), King and Kitchener (1994), and Baxter Magolda (1992, 1999) are among those who have built on Piaget's stage theory of development, locating their studies in university or college contexts with young adults. Perry (1970) identifies nine positions of development, moving from the least complex stage of Basic Duality where the existence of absolute truth is presumed, with Authority (possessors or mediators of the absolute truth) acting as mediator between the individual and the truth, through to the most complex stage of Commitments, which represents a relativist position where the self is orientated in a relative world involving personal values and choice (Perry, 1970). Each of the nine positions represents a structure which in its narrowest sense Perry refers to as the formal properties of the assumptions and

expectations a person holds at a given time with regard to the nature and origins of knowledge and value.

This discussion will further draw on perspectives of individual development advanced by Baxter Magolda (1992, 1999), King and Kitchener (1994, 2004) and Kegan (1994). Baxter Magolda states that the meaning students make of their educational experience is as a result of "their assumptions about the nature, limits, and certainty of knowledge" (1992, p.3). This definition does not include explanations of the influence of context and, potentially, structural mechanisms, which will be addressed later in this thesis. Baxter Magolda (1999) refers to these epistemological assumptions collectively as making up *ways of knowing*. Her model of Epistemological Reflection (Baxter Magolda, 1992) describes Four Ways of Knowing as summarised in Table 6.5. Her analysis includes gender-related reasoning patterns emerging from a longitudinal study of both men and women.

Table 6.5 Epistemological Reflection Model

Ways of knowing / **Domains**	**Absolute knowing**	**Transitional knowing**	**Independent knowing**	**Contextual knowing**
Role of learner	Obtains knowledge from instructor.	Understands knowledge.	Thinks for self Shares views with others. Creates own perspective.	Exchanges and compares perspectives Thinks through problems Integrates and applies knowledge.
Role of peers	Share materials Explain what they have learnt to each other.	Provide active exchanges.	Share views. Serve as a source of knowledge.	Enhance learning via quality contributions.
Role of instructor	Communicates knowledge appropriately. Ensures that students understand knowledge.	Uses methods aimed at understanding. Employs methods that help apply knowledge.	Promotes independent thinking. Promotes exchange of opinions.	Promotes application of knowledge in context. Promotes evaluative discussion of perspectives Student and

				teacher critique each other.
Evaluation	Provides vehicle to show instructor what was learnt.	Measures students' understanding of the material.	Rewards independent thinking.	Accurately measures competence. Student and teacher work towards goal and measure progress.

King and Kitchener (1994) developed a stage model of reflective judgment, presented in Appendix A1.3, which describes seven stages of epistemological assumptions and how these affect thinking and reasoning. The last two stages reflect more mature ways of thinking where individuals can create knowledge, recognise the contextual relevance of knowledge and deal with ill-structured problems.

Kegan (1994) adds to the epistemological dimensions development with his theoretical constructive-developmental model which describes the personal way we organise our experiences. Baxter Magolda (1999) credits Kegan with adding to her views on students' assumptions about the nature of knowledge by introducing interpersonal and intrapersonal dimensions. His model describes five *orders of consciousness* representing an evolution from child to adulthood, and characterised by principles which affect thinking, feeling and relating to self and others (Baxter Magolda, 1999). These principles explain *how* we make meaning of thinking, feeling or interacting with others, rather than the content of this meaning (Baxter Magolda, 1999). Jones and Corner (2011) describe Kegan's model as useful for understanding what they term 'systems intelligence' which bears similarities to systems thinking development as discussed earlier in this thesis. In his descriptions of these orders of mind, Kegan (1994) states that adults are likely to construct reality at the third and fourth orders, with few moving beyond the fourth order (Kegan's studies only saw evidence of this after the age of forty). The demands which adults face, such as a curriculum in management studies, may be based on an order of mind not matched by the adult student. In the quotation below Kegan illustrates how the fourth order demand for self-direction in a university course has an expectation of a particular response which may not be interpreted as such by the student.

> *We would like them to understand that when we told them to think for themselves, we did not really mean, "be sincere, use your own opinions," but that's what it means to them. We want them to hear, "think for yourself," as something more like, "take charge of the concepts of the course and independently bring them to an issue of your own choosing." ... experts'*

> *expectations that adults be "self-directed" learners may really be a claim on mind for a specific kind of self and a specific kind of direction, namely that of fourth order.*
>
> Kegan (1994, p.285)

The notion of the "diversity movement" is used by Kegan to illustrate a fourth-order response. Such a response to issues of diversity would recognise that ways of understanding are ideological with some ideologies considered more accepted and legitimate than others. This fourth-order expectation of the diversity movement anticipates relationships which include and respect different cultures. As said by Kegan (1994, p.345, emphasis in text):

> *This view does not mean that the challenges are co-opted into the status quo. It means that the old status quo is replaced by a new status quo. It does not mean that blacks can come into the office only if they act white. It does not mean that women's experience is included in the curriculum simply by changing pronouns and making a "Michael" example into a "Mary" example. It means that formerly marginalized people will come into the office, and they will have their own distinctive way of seeing things, setting the agenda, getting the goals accomplished; and it means that these ways will be recognized, acknowledged, and respected, provided that some common ground can be found where all contending "cultures" in their wholeness and distinctiveness can stand. This common ground becomes, in effect, a new status quo and a new ideology, but a much more wholesome one.*

This way of thinking implies an evolved consciousness as described and illustrated by Kegan. It does, however, place power and responsibility with the individual or agent for change. This view has support beyond developmental models, for example, Bánáthy, who comments that "conscious evolution enables us to use the creative power of our minds to guide our systems and our society toward the fulfilment of their potential" (1996, p.317). In chapter 2, a discussion of the role agents have in shaping structures or social systems is considered in the context of critical realism. The work of Kegan (1994), in describing dialectical thinking as a stage of adult maturity, accounts for the potential for adults to acquire the ability to accept and respond appropriately to paradoxical and contradictory phenomena in life.

Self-directed learning

As learning rather than teaching is considered to effect changes in management practice, the concept of self-directed learning may be useful in theorising how these changes take place. Brookfield describes self-directed learning as "learning in which the conceptualization, design, conduct and evaluation of a learning project are directed by the learner" (2009, p.2615). He goes on to say that this does not mean that learning occurs in the absence of others; instead, working with others in groups or engaging with peers is a choice that the self-directed learner sometimes makes. Kegan (1994) notes

that the curricular aspirations of adult educators converge on notions of "self-directed learners" who, he says, quoting from Grow (1991), are able to:

> *"examine themselves, their culture, and their milieu in order to understand how to separate what they feel from what they should feel, what they value from what they should value, and what they want from what they should want. They develop critical thinking, individual initiative, and a sense of themselves as co-creators of the culture that shapes them […] Self-directed learners set their own goals and standards, with or without help from experts. They use experts, institutions, and other resources to pursue these goals… [They] are both able and willing to take responsibility for their learning, direction, and productivity. They exercise skills in time management, project management, goal-setting, self-evaluation, peer critique, information gathering, and use of educational resources."*
>
> (Grow, 1991, p.134)

Kegan (1994) points out the frustration, surprise and disappointment expressed in the literature at the large numbers of adult learners who either achieved these goals with difficulty or not at all. He further advocates that adult educators should seek to educate for the order of mental complexity that enables self-directed learning and, in doing so, satisfy the aspirations of adult learners.

Critique of developmental models

These models were developed from empirical studies in particular contexts and are not uncritically transferable to other contexts. Baxter Magolda has acknowledged potential limitations with respect to the homogeneity of the students participating in the study by stating explicitly that the themes identified in her interviews "may be significantly different for all non-majority students whose socialisation and experiences with authority and peers have taken place in different cultural contexts" (Bock, 1999, p.30). Her study was located at Miami University in the USA. By Baxter Magolda's admission, the students in these studies were of traditional college age, overwhelmingly white and middle class.

These cautions direct researchers to context-embedded studies, as each case could have a number of variables that distinguish it from the contexts in which the models above were developed.

An assumption of this thesis is that people are not necessarily located in a particular stage of development, in a way that is independent of the context or problems they are required to deal with. To illustrate this position, people could possibly deal with ill-structured problems in one context, for example dealing with family situations, while not being able to do so in another context, such as learning systems methodologies in a formal classroom environment.

Although this thesis draws on linear and categorical models of development with inclusion of dialectical concepts, some explanation regarding the explicit contribution they make and how they cohere with respect to the philosophical assumptions articulated in this thesis, is discussed here. These stages are viewed as descriptions of possible patterns that emerge as effects from interactions of variables at a particular point in time, as opposed to a particular stage of development that an adult has reached without consideration of the referential context. For example, in the context of a formal learning activity, with a particular instructor and group members with certain types of life and work experiences, learning as an emergent property from the interaction may facilitate independent ways of knowing. In another context, with a different set of variables, contextual ways of knowing may emerge. The models of Baxter Magolda, King and Kitchener and Kegan for example, provide well-articulated descriptions of the possible forms of knowing, complexities of thinking and capabilities regarding engagement with contradictions and paradox. While these are conceptualised as cognitive responses to life and work situations, the factors which trigger, facilitate and contribute to them are not clearly revealed. When viewed with a complexity theory or systemic framework, these processes can be seen as creative, emergent responses within a particular experience, framed in time and dynamic space (as opposed to static) with interacting variables.

6.1.3 Conceptions of learning

As part of the data collection process in this thesis, students were interviewed about their learning experiences. As noted previously, there are a number of definitions for systems thinking and learning. A body of research based on empirical work in the area of conceptions of learning considers the question '*what is learning?'* from the point of view of those participating in the learning process. This has revealed interesting classifications and descriptions of the self-reported learning constructs people hold of what learning is. These conceptions have been shown to be influenced by the learning context and are linked to students' epistemologies which will influence what is eventually learnt. Marton, Dall'Alba and Beaty (1993) are a much-quoted example of these studies. They describe six qualitatively distinctive categories of 'conceptions of learning'. These categories include those considered quantitative, i.e. concerned with an increase in knowledge, and those considered qualitative, i.e. concerned with a change or transformation in understanding of a phenomenon. This area of research has been expanded by a number of subsequent studies which has contributed additional categories or variations in different contexts (for example Cliff, 1998). While studies in the area of self-reported student conceptions of learning and the link to learning outcomes have made a significant contribution to our understanding of student learning, the way learning conceptions can be crafted to achieve our goals as educators, has, according to Cliff (1998), not been the explicit subject of many studies.

6.1.4 The importance of context in learning

Ramsden (1992) points out that student response to a learning environment is informed by their experience of the environment, and their experience is "unpredictable". Davis and Sumara, in conceptualising the unpredictable influence of the role of the educator and context in learning, describes learning as "occasioned" (1997, p.115). Complexity theory considers learning to be a complex interaction of knowledge, phenomena, events, activity, community and actors which are mutually dependent and mutually constitutive with emergent outcomes (Davis and Sumara, 2001). Learning, in this view, can be occasioned by disturbances which become amplified, leading to emergence of new patterns. This is consistent with the systems concept of emergence where the components of a system, which in the case of a learning environment could be described as the individuals, the setting and relationships between them, interact in a way which produces emergent behaviour which cannot be predicted solely by understanding the behaviour of the individual components. Every learning occasion therefore has the potential to be unique. This, however, has to be viewed with the understanding that when designing conditions for learning, we have expectations of what *should be learnt* (Marton and Tsui, 2004). Wilson (1996) cautions that the complex nature of learning is not an excuse for lack of careful design and planning, as he considers that the instructional designer should provide proper support, guidance and access to rich resources and tools. The purpose of the designer is, in Wilson's (1996) view, to provide a supportive, nurturing environment where students have the opportunities to be successful at attaining their learning goals.

The learning environment is assumed to set up experiences which could trigger reactions, not only at the time of participation, but with interactions in, for example, the workplace, something could act as a trigger for change later. As noted previously, different factors can impact on learning experiences in different contexts.

As management educators we need to develop models on which to base our actions and inquiry.

Summary and discussion

The range of theories presented in this section to explain adult learning attests to the complexity of the area. The absence of a single model for describing the complexity inherent in learning necessitates an engagement with a range of theoretical perspectives in order to develop a conceptual framework which provides coherent and robust explanations for all aspects of the field of inquiry. Each of the theories presented provides relevant and plausible explanations of aspects of the how, why and what of adult learning. Davis and Sumara said of the range of learning theories: "while such theories might be taken as conflicting and occasionally contradictory, in fact they can be read as complementary when one considers the implicit dynamics and the varied bodies (biological, social, political, etc.) under consideration" (2007, pp.53/54).

In the research context in which this thesis study is based, the learning theories informing the design of the course primarily drew on experiential and transformative theories. Cognitive developmental theories provided explanations for potential consequences of learning, i.e. development of more complex thinking.

In conclusion:

- Learning, rather than teaching, effects change;
- Teaching can influence the learning environment although the consequences are emergent;
- Transformative change in learners from less to more complex meaning making is possible;
- The shifts that are assumed as a consequence of learning are explained by the developmental theories presented; and
- The role of the adult student in the learning process can be explained by the theories of self-directed learning and cognitive development.

6.2 Learning systems thinking

The conceptual understandings that students are encouraged to develop in their participation in formal study is expected to be consistent with those held by experts in the field (Orgill, 2007). Therefore, while adult students are encouraged to develop their own knowledge and theories, the expectation is that their knowledge has validity or trustworthiness which reflects the norms and conceptual understandings which characterise the particular discipline. Drawing on her own experience of teaching systems thinking and that of others at Saybrook Institute in the USA at the time, Salner (1986) noted that "some students who were otherwise mature, capable and intellectually able, failed to grasp and adequately apply systems concepts" (p.225). These difficulties were expressed by Salner (1998) in a later paper as:

1. Conceptualising interactions as non-systemic, i.e. as simple, linear and additive (p.4);
2. Failing to conceptualise complexity; and
3. Difficulties with tasks involving creating or selecting methods for the design or modification of systems.

As explained in chapter 1, there are a number of conceptions of systems thinking held by experts in the field that are informed by different philosophical assumptions. Houghton (2009, p.106) views this in a positive light, describing "the multiple use of constructs that though contradictory, lead to greater insights and a version of events that reflects a systemic/multidimensional reality".

In her study which involved asking 205 interviewees how they defined systems thinking, Davidz (2006) found very divergent conceptions of systems thinking. In the case of the conceptions of systems thinking held by students entering a programme of formal study, these could potentially be a factor in their learning. The difficulties expressed by students as presented by Salner relate to core assumptions in the theory and practice of systems thinking. Understanding the conceptions students hold for systems thinking is therefore important: as Marton (1986) claims, a "careful account of the different ways in which people think about phenomena may help uncover conditions that facilitate the transition from one way of thinking to a qualitatively better perception of reality" (1986, p.33).

6.2.1 Systems thinking and skills requirements

While systems thinking is not a theory of learning, learning is central to the practice of systems thinking. Midgley (2000) presents a model of learning intending to address concerns related to the difficulties of implementing methodological pluralism. The intention with this model is to develop *skills* over a period of time, learning from practice. Although Midgley does not specify a minimum set of skills required by agents embarking on systems interventions, he does specify a willingness to learn from practice. The limitation of learning as individuals is noted by Midgley who proposes learning at individual and organisational/community levels to improve systemic intervention practice.

Research on the development of systems thinking skills comes primarily from the tradition of 'Systems dynamics', which is a specific area of systems thinking particularly concerned with temporal feedback (Davidz, 2006). This work was pioneered by Jay Forrester and subsequently led by John Sterman at Massachusetts Institute of Technology (MIT). Examples of empirical work in this area will be presented later in chapter 6.

Despite an attempt to distinguish his work from systems dynamics by specifically replacing the term *systems dynamics* with *systems thinking* (Richmond, 1993), Richmond's definition of systems thinking is similar to contemporary definitions used by John Sterman, director of the System Dynamics Group at MIT. Richmond (1993) suggests seven critical systems thinking skills. These are: dynamic thinking, closed-loop thinking, generic thinking, structural thinking, operational thinking, continuum thinking and scientific thinking. He advocates that operating with all seven thinking skills simultaneously would constitute good systems thinking. Ossimitz (2000) has condensed Richmond's list into what he calls four dimensions of systems thinking, i.e.:

1. Thinking in models (modelling reality);
2. Closed-loop thinking (in opposition to linear cause and effect, the consideration of multiple effects and circular causality);
3. Dynamic thinking (considering time, both the past and anticipating future behaviour); and

4. Steering systems (concerned with action).

While these may be appropriate for the quantitative nature of systems dynamics, some of these skills may not be appropriate for the interpretive and critical nature of other approaches such as Soft Systems Methodology (SSM) developed by Peter Checkland. SSM is intended as a systemic learning process (Jackson, 2003) developed in part to engage with pluralist world-views in problem situations. As such, skills related to interaction and participation with others, such as communication, facilitation and interpersonal skills, would be needed by these systems analysts.

These attempts to identify skills serve to illustrate the observation that researchers consider systems thinking to demand something particular from those who practise it. Hung describes systems thinking as "one of the most important higher order thinking skills in advanced learning, yet the most difficult to master" (2008, p.1100). He explains possible factors which may contribute to these difficulties, such as the deep conceptual understanding required for systemic understanding of systems; the abstract nature of inter-causal relationships which tend towards "imperceptibility" (p.1101); and the complexity of inter-causal relationships requiring systemic understanding, which is considered by Sterman (2002) to be counter-intuitive.

In the diagram below, Figure 6.3, the methodological orientations of key authors with regard to the skills required for systems thinking are mapped onto Jackson's (2003) ideal-type grid for problem contexts.

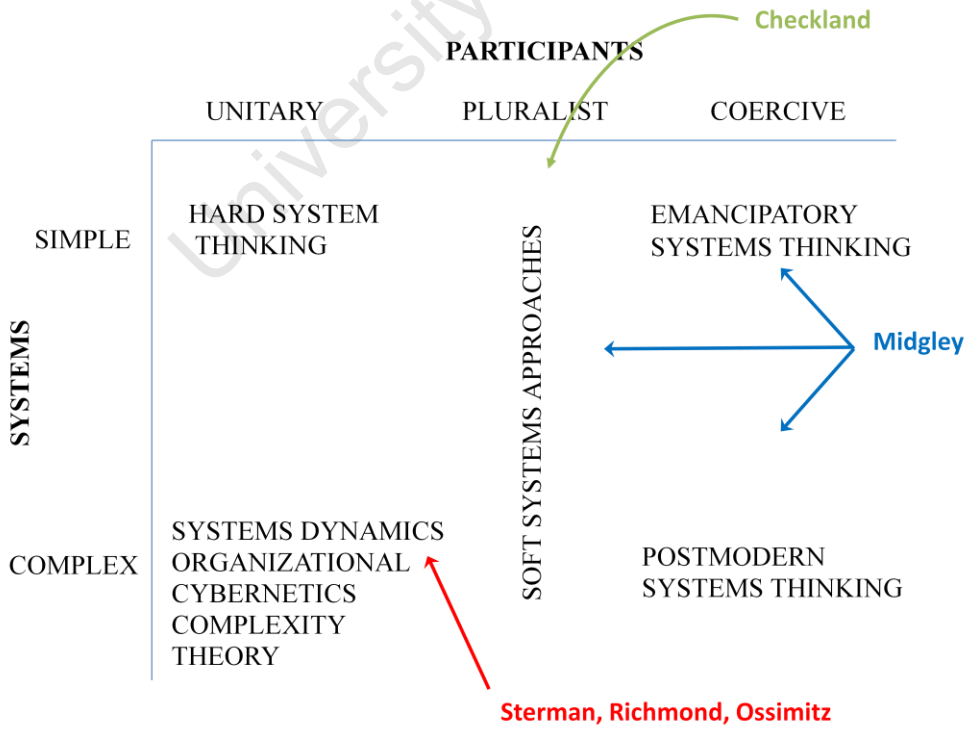


Figure 6.3 Skills related to methodological orientations

In conclusion, the skills needed for systems thinking and practice depends on the nature of the problem and the methodological approach selected, for example, the skill to identify stock and flow relationships is essential for systems dynamics but is not required for SSM. While there is agreement on skills common to all approaches (see for example Hung, 2008), moving along the horizontal axis in Figure 6.3, the skills required for Hard Systems Thinking capacity would generally involve application of mathematical and quantitative skills while Emancipatory Systems Thinking capacity also requires skills such as facilitation and negotiation.

6.2.2 Systems thinking and knowledge development

In the title of his 2006 book, *Realising Systems Thinking, Knowledge and Action in Management Science*, Mingers links systems thinking to knowledge and action in management science. Although the nature of knowledge continues to be a topic for debate both within and beyond the systems community, the claim by Mingers (2006) that "actual human knowledge can never be certain or known to be correct" (p.146) is one that has support in the systems community (e.g. Midgley, 2000).

Mingers (2006) discusses a range of views to preface the four types of knowledge which he proposes.

These are described in Table 6.6 with an example from systems thinking to illustrate each type.

Table 6.6 Forms of knowledge (adapted from Mingers, 2006)

Form of knowledge	Explanation	Source of knowledge	Example
Propositional knowledge	Know *that*. Generally explicit and conscious, gained by direct perceptual knowledge or through being told via linguistic, non-verbal forms or books, papers.	Direct perception, receipt of information, communication, media.	Knowing that causal loop diagrams can be used to model causality.
Experiential knowledge	Knowing *through lived experience*. "Our own individual previous experience." "To know in this sense is to be acquainted with or to be familiar with" (Mingers, 2006, p.136). Depth of knowledge is variable.	Personal experiences	Having experienced using causal loop diagrams (CLDs) in a work context and finding that it contributed to understanding the context.
Performative knowledge	Know *how*, skill or competence in order to be able to do something. This form of	Personal experiences, learning, training.	Knowing how and when to use CLDs to model systems behaviour i.e.

	knowledge may be pre-conscious, and is inherently embodied.		demonstrating skill with CLDs.
Epistemological knowledge	Know *why*. This is the domain of explicit, discursive knowledge and includes scientific knowledge. In the main it refers to knowledge that is scholarly and generated through established procedures and methodologies. This knowledge as the consequence of inquiry goes beyond the empirical to consideration of underlying reasons or causes. Concerned with truth and validity.	Formal methods of discovery e.g. in science.	Conducting methodologically trustworthy research process to establish generative causal mechanisms and the relationships between them in order to represent systems behaviour in the form of a CLD.

With the recognition of knowledge as a polyvalent term in the context of systems thinking, this should be kept in mind when designing interventions to develop systems thinking. While these different types of knowledge contribute to understanding ways in which knowledge can be thought about, the next section of this chapter includes contributions of authors who argue that there are qualitative differences in knowledge of different individuals and situations.

6.3 Empirical and conceptual studies related to the learning of systems thinking

In the process of refining the topic of the study and reviewing available literature, it became apparent that a wide range of conceptual lenses had been explored in systems education inquiries, with cognitive theories emerging as the most prominent theoretical framework. Bosch, Maani, McIntyre, Ossimitz, Ramage and Vesterby (2010) describe systems education as "highly fragmented, both intellectually and pedagogically" (p.3) in a publication emanating from discussions of systems educators in 2010. In 2002, Kay concluded that "the education of systemic thinkers is a topic that rarely draws attention in the systems literature, yet in many ways is central to the success of systems approaches in practice" (2002, p.515).

While claims from empirical studies were drawn on throughout this chapter, this section serves to explore research studies in similar or related areas in order to locate this thesis within a larger body of work and identify the gaps where further contributions are required. The range of literature on *systems thinking*, *systems theory*, or *systemic thinking* is characterised by variety in theoretical

frameworks, disciplines and claims, with the focus primarily on practical applications or theoretical debates rather than empirical studies. A small percentage of articles were based on research located in a formal educational context.

6.3.1 Systems research in education

Ison (1999), in an editorial for a journal issue on the application of systems thinking in higher education, describes the diversity in the use of systems ideas and methodologies in higher education. The range of applications includes the management of organisational issues in universities, researching curriculum design and delivery, and teaching. Biggs (1993) also looked to the application of systems theory in educational research as a means to make sense of the interdependencies of the many variables in an educational context, arguing that theories of tertiary teaching and learning need to be built up "in the context to which it is to be applied" (Biggs, 1993, p.74). In 1999, Ison commented on the dearth of literature in the area, concluding that the potential for the application of systems ideas in teaching and learning research largely remains unfulfilled.

In the next section, the discussion will be limited to two areas of empirical studies, those which explore the skills and mechanisms required for systems thinking and those that focus on the design of systems courses or learning. This will be followed by the substantiation of the claim that the development of systemic thinking is not well discussed in management education literature.

6.3.2 Learning to be systemic

Davidz (2006) conducted an empirical study for her doctoral research at the Massachusetts Institute of Technology (MIT) on the development of systems thinking in systems engineers. In her thesis entitled *Enabling systems thinking to accelerate the development of senior systems engineers*, Davidz (2006) was concerned with identifying the enablers, barriers and precursors to systems thinking development in engineers. Her findings from interviews and surveys of 205 people in 10 host companies revealed *experiential learning*, *specific individual characteristics*, and *a supporting environment* as primary mechanisms that enable systems thinking development. While her study focused specifically on the development of systems thinking by systems engineers, it has relevance for this study as she articulates the purpose of her thesis as understanding the development of systems thinking.

The most prolific area of scholarship on how people learn systems thinking specifically focuses on how people learn systems dynamics or systems engineering. Sweeney and Sterman (2000) are among those who were interested in how students (including schools and undergraduate programme participants) use systems dynamics to model complex environments. They concluded that:

"A number of experimental studies examine how people perform in dynamically complex environments. These generally show that performance deteriorates rapidly (relative to optimal) when even modest levels of dynamic complexity are introduced, and that learning is weak and slow even with repeated trials, unlimited time, and performance incentives ... The usual explanation for our poor performance in these studies is bounded rationality: the complexity of the systems we are called upon to manage overwhelms our cognitive capabilities."

(Sweeney & Sterman, 2000, p.251)

Sweeney and Sterman (2000) use the term 'skills' to describe requirements for applying systems thinking. They advocate that systems thinking skills need to be supported and supplemented by scientific reasoning and basic skills (Table 6.7). These studies have been conducted in the context of systems dynamics which requires direct application of mathematical skills.

Table 6.7 Skills for systems thinking (adapted from Sweeney, 2000)

Scientific reasoning skills	Systems thinking skills
• The ability to use a wide range of quantitative and qualitative data • Familiarity of domain specific knowledge of the system under study • Some business knowledge, for example of psychology, economics, decision-making, organisational behaviour.	• Recognise delays and understand their impact; • Identify non-linearities; • Recognise and challenge the boundaries of mental and (formal) models; • Identify stock and flow relationships; • Discover and represent feedback processes (both positive and negative) hypothesised to underlie observed patterns of system behaviour; • Understand how behaviour of the system arises from the interaction of its agents over time (i.e. dynamic complexity).
Basic skills	
• Interpreting graphs, creating graphs from data • Telling a story from a graph, creating a graph of behaviour over time from a story • Identifying units of measure	

- Basic understanding of probability, logic and algebra.

In 2002, Sterman extended on the skills noted in Table 6.7, proclaiming that becoming an effective systems thinker also requires "respect and empathy for others and other viewpoints. Most important, and most difficult to learn, systems thinking requires understanding that all models are wrong and humility about the limitations of our knowledge" (p.501).

Ossimitz (1996, 2000) conducted his research on the development of systems thinking in high schools in Austria. Located in the systems dynamics tradition, he conducted pre- and post tests of student engagement with systems modelling and simulation. Ossimitz (2000) based his understanding of systems thinking on four characteristic dimensions, namely thinking in models, steering systems, thinking in loops and dynamic thinking.

Focusing on the relationship between teaching methods and acquiring systems thinking skills, Hung (2008) explored enhancing systems thinking skills with systems modelling. He claimed promising results with teaching types of modelling to help overcome difficulties such as imperceptibility, complexity and the counter-intuitiveness of non-linearity, feedback and time delay. This, Hung said, can be explained by the way modelling serves as a cognitive tool to "help learners visualise the unperceivable inter-causal relationships and reduce cognitive overload caused by the complexity of the reasoning tasks" (p.1101).

While Salner's (1986) work is more conceptual than empirical, it deserves a mention in this section as her contributions were derived from her experience of teaching systems thinking. Through observations, assessments and experimentation with pedagogical practices, Salner (1986) identified a range of competencies necessary for systems learning. She made a link between these competencies and epistemological development compatible with systems competencies, noting that systems thinking required people to "think epistemologically" (1986, p.225). This ability Salner views as consistent with level three of Kitchener's (1983) cognitive processing model, involving thinking about and evaluating the assumptions of knowledge (e.g. what are our limits in relation to having knowledge of a problem context? What assumptions are we using in thinking about the problem context?). Salner (1986, 1998) considers that these goals are not unique to systems learning and can be achieved though "liberal or general education" (Salner, 1986, p.225). The claims she makes from her studies include the conclusion that 'systems competencies' are manifested as:

- *The ability to see relationships between wholes and parts, i.e. balancing the processes of analysis and synthesis;*
- *The ability to abstract from real situations in order to reveal organising structures;*

- *The ability to cope with flexibility and real-world change in the face of a conceptual need for stable systems boundaries and parameters;*
- *Commanding and making choices between multiple methods for problem-solving instead of applying a limited range of algorithms to a wide range of situations;* and
- *Awareness that reality is being modelled and as a consequence 'the map is not the territory'.*

(Salner, 1986, p.230)

In addition to resulting in a conceptual contribution of how people develop systems thinking competencies, Salner (1986) makes recommendations for pedagogic practices which she has applied in her teaching. At a postgraduate level, Atwater and Pittman (2006) describe three dimensions of systemic thinking: thinking holistically, thinking dynamically, and thinking in terms of feedback loops.

In conclusion, the work of Salner, Sweeney and Sterman, Ossimitz and Davidz all focus on the individual abilities, skills and competencies necessary for systems thinking.

6.3.3 Design of systems courses

A small number of published papers in systems education have focused on the conceptual design of curricula for education of systems concepts, systems thinking and systems practice. These studies have included those conducted at school, undergraduate and postgraduate programme levels. In these studies, a clear distinction was not found between teaching systems thinking and teaching students to think systemically.

At an undergraduate level Janes (1979) reported on implementing the structure and operation of a systems-based interdisciplinary degree course at The City University, London. Table 6.8 represents a summary of the aims, outcomes and problems experienced with this course.

Table 6.8 Example of a systems science undergraduate course (from Janes, 1979)

Aims	Positive outcomes	Problems experienced
The ability to apply the thinking and methods of systems science in tackling complex interdisciplinary problems.	Experienced by students as thought provoking, mind broadening, work produced at a higher standard than normally expected at undergraduate level.	*With regard to student skills*: Need for mathematics for teaching systems concepts at appropriate depth.
An intellectual framework which integrates the social, managerial and	Graduates have no problems	*With regard to systems science:*

natural sciences. Fluency and both literate and numerate modes of thought and expression. A broad educational experience which will equip prospective graduates for careers in management and administration, or provide a precursor for postgraduate studies in systems science, management or political science.	advancing to interesting and gainful employment or postgraduate study.	Difficulties with grasping higher-level concepts. Abundance of vague terminology and overlapping subjects were experienced as confusing.

In agriculture education, Bawden's collaborative work focused on worldview change (Kay, 2002). The curriculum developed at the University of Western Sydney in Hawkesbury, Australia, was implemented in an undergraduate degree in Systems Agriculture. The course design was based on experiential learning, systems thinking and adult learning theory. The model on which the degree was based included shifts from traditional models as described below (Patterson, 2007):

- Shifts to agriculture as systems and subsystems instead of disciplines;
- Systems and problem-solving approaches to learning instead of reductionist science and teacher focused instruction;
- Learner-centred strategies; and
- Systemic organisational changes to the School in which the programme was offered.

Kay (2002) takes an interesting conceptual approach to the design of a curriculum in systems education. He draws on the theory of autopoiesis (Maturana & Varela, 1987; Maturana, 2002) to provide explanations of the world-view change which he argues is required for systems thinking. His conceptualisation of world-view change would constitute the adoption of several paradigms as opposed to involving change from one paradigm to another. He proposes that a curriculum where the purpose is to facilitate the development of a systemic world-view on the part of the student requires three characteristics. These include:

- Firstly, an environment for the student to reflect upon their assumptions about how and why they do things;

- Secondly, access to abstract linguistic distinctions for the student as cues or potential triggers for change, i.e. the cues should be present in the environment in order that the descriptions students use to orient themselves in the environment become triggers for change; and
- Thirdly, control of the change process by the student rather than the educator, motivated by the need to maintain autopoiesis and therefore structural coupling with the environment. This should result in the re-evaluation of their assumptions as described in the first characteristic above.

Kay (2002) notes that the educator's focus should be on the environment, in sympathy with the characteristics described above, rather than on changing the student.

Strümpfer and Ryan (1994) reported on their experiences in teaching systems thinking as part of an MBA programme. They list a number of core competency areas for application of systems thinking, including: systems knowledge, problem-solving approach, application fluency, communication capabilities and appropriate attitude (mindset) (1994, p. p.88). The course design drew on Kolb's cycle as a learning model and incorporated social modes of learning. Although they reported success in participants' application of systems principles, they recognised the difficulty in achieving mindset change, writing that "we may be far from understanding how to achieve this in an efficient manner" (p.94).

This section has illustrated that research in systems education by no means represents a cohesive body of scholarly work anchored by a central debate. Instead it represents a rich and varied offering which has produced some common claims. Researchers have problematised the development of systemic thinking and explored the use of a number of theoretical frameworks to explain this challenge and to inform the design of courses to promote systemic thinking. These theoretical frameworks include systems theories derived from biology e.g. autopoiesis (Maturana & Varela, 1980), developmental/cognitive theory, e.g. cognitive development, and learning theories e.g. experiential and transformative theories.

Chapter conclusion

Selected learning theories were discussed for the purpose of locating the pertinent concepts that informs the study in a larger theoretical domain, as well as a guide for critically engaging with the learning and pedagogical activities described in Chapter 3 where the research context is described. Ranging from cognitive approaches to social and complexity theories of learning, the intention was to highlight the importance of considering the contribution of the individual, the influence of others who participate, the context as influential in the learning process and those theories which propose a dialectic relationship between the individual and the context.

Finally, a discussion of previous studies in systems education, while varying in their context and theoretical approaches, indicates that they agree that thinking systemically can be achieved through appropriate learning activities.

In the next chapter, the theory is presented in summary as a synthesis of the phenomena presented in chapters 4 and 5. This is followed by a brief discussion of possible generative mechanisms that could account for the experiences outlined in previous chapters.

Chapter 7 A theory for the learning of systems thinking

Introduction

In this chapter, the findings of the research are presented as a theory integrating the two sets of phenomena discussed in chapters 4 and 5. Taken together these phenomena describe the phases of progression as students' learn systems thinking and how they mediate pedagogical practices as a process of discovering and realising their agendas. This is followed by a brief discussion that extends the main threads of the grounded theory in an effort to explain possibilities for the differential experience of students in the learning process. Literature and analysis are drawn on to explain: 1) socio-cultural influences characterising work and academic environments as possible systemic and socio-cultural conditions for the progress of students and 2) the powers of students as agents able to mediate these conditions.

7.1 Evolving process of learning

The model describing the progression of interpretations of the learning of systems thinking has emerged as a process constituting four related phenomena: *starting out, assimilation, knowing the change* and *integrating and adapting*. All four phases have sense-making in common. The student experience as progress in this process is qualitatively differentiated by five additional phenomena: *elements which mediate assimilation, group work as social pedagogy, individual characteristics and ability, learning strategies* and *contextual application.* These phenomena were developed through exploring the relationships between the nine phenomena. These relationships are illustrated in Figure 7.1.

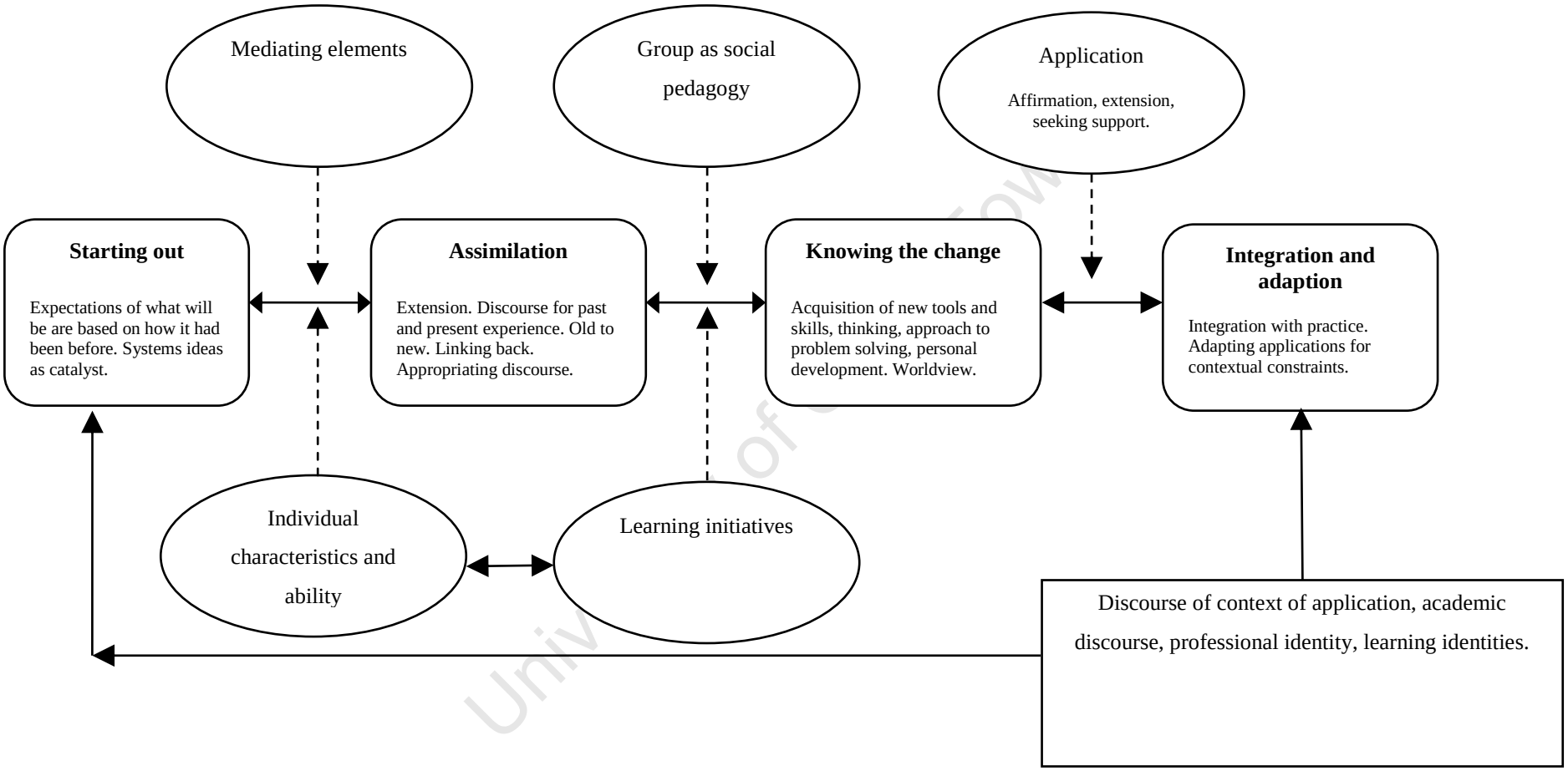


Figure 7.1 Depiction of the process of the learning of systems thinking

The findings reflect a context characterised by a high variety of learning events and a conceptual complexity that is influenced by work and academic environments. Forty-eight (48) propositions linking the concepts and categories within this model were generated, collectively describing the process of the learning of systems thinking (see Appendix F).

In the section below general accounts of the real domain are considered through hypothesising generative causal relationships which have the potential to condition events experienced in the empirical domain. This need to account for interpretations and observations beyond that of the analysis of the articulated perceptions and experiences of students is addressed here by considering possible socio-cultural structural elements as conditions that contribute to the emergent behaviour presented thus far. The term socio-cultural in this context is taken to mean, "the means and conditions under which the learner is involved in the learning process" (Schwandt, 2005, p.178). The purpose of this consideration is to acknowledge contextual factors that condition learning and could account for the actions of agents.

7.2 Mechanisms that impact on the learning of systems thinking

There are a number of mechanisms which can be argued to enable or constrain the practice of thinking systemically as characterised in earlier sections of this research study. These mechanisms produce causal powers at different levels, for example, at the level of society, the university, the academic department, the management programme and the classroom. While social theories built on critical realism provide detailed constructs for such analysis (for example, Archer, 1996), ideas derived from Bhaskar's first wave of critical realism influenced the approach taken here.

A range of potential causal mechanisms such as those of a biological, political, psychological, and socio-cultural nature could be used as explanation. In this study, socio-cultural mechanisms have been selected as these emerged as influential in the empirical domain during the grounded analysis. These will be discussed in the sections below as an analytical separation of the academic and the work environments in order to explain the differential experiences of students.

7.2.1 Academic environment

In order to frame the account of generative mechanisms, a description of the academic environment is interspersed with the discussion of possible causal mechanisms and emergent properties. This has been achieved by explaining competing discourses, as well as roles and relationships, in the academic context.

Competing discourses

Drawing on Archer, Quinn (2006, p.18) describes the meaning of discourses for realists as "cultural emergent properties with enabling and constraining causal powers to affect things in the world."

Quinn (2006) notes that cultural emergent properties, including discourses, can exert "a conditioning (but not determining) influence on social actors" (p.18). This view has support from critical cultural perspectives as illustrated by Fenwick's description of the cultural space of learning as shaped by discourses and their semiotics that are most "visible and accorded the most authority by different groups" (Fenwick, 2001, p. 40). The identification of those discourses can therefore inform explanations of the possible contribution they make to condition the social context for the learning of systems thinking.

At the level of the field of management education and learning, Schwandt (2005, p. 177) describes "inherent tensions associated with the dualist nature" of social theory perspectives of management. Tension between discourses in the field of management education and learning is also explored by Clegg and Ross-Smith (2003) who identify a discursive tension between positivist, mechanistic approaches and approaches which have a critical and practice-orientated focus. They argue that environments for learning in schools of business and management should assume "discursive plurality" where "differences in domain assumptions are explicitly tolerated" (p. 85). Incidents of discursive tension at this level appeared in the data, particularly in the repertory grid rating process where a learning event, such as *business calculations*, had relatively low correlations with events that were associated with practice, such as *systems tools*.

At the level of the academic department where the course is offered, the tension exists primarily between the dominant engineering science orientation, which characterises the discourse of the department which offers the course, and the multidisciplinary practice orientation of the management programme and systems practice course. The dominance of an engineering science discourse in academic environments has resulted in the isolation of engineering teaching and scholarship from the pragmatic concerns of professional practice (Johnston, Lee & McGregor, 1996). The management programme and course were therefore not 'visible' or accorded authority within the engineering discourse. A number of reasons are provided below to support this position:

- The programme is based on a model which was the only one of its kind (practising managers and working students attending lectures part time) in an engineering department with a large number of undergraduate students and discipline-specialised postgraduate students;

- In discipline-orientated faculties and departments of universities, specialisation, which typically contributes to knowledge within a discipline or field, is favoured by internal and external pressure on research;

- Management research, as characterised by the systems focus in the course and programme, is largely based on management practice requiring multidisciplinary and pluralist approaches;

- Multidisciplinary and pluralist approaches to research have the weight of "cultural capital" against them, bedevilling the efforts of individuals to gain institutional and cultural credibility.

The engineering science discourse at the level of the department is potentially incompatible or in conflict with the discourse of the systemic management programme, resulting in the isolation of the programme and the restriction of the formal access those students have to the academic debate pursued and valued within the department. This did not emerge as a strong influence in the student data, but the perceived incompatibility and departmental support for students would influence the decisions and behaviour of academic staff.

At the level of the programme, discursive tension between academic and management discourses impacted upon students' experience of learning events. To demonstrate this distinction, Elbow's (1991) description of academic discourse as "discourse which academics use when they publish for other academics" (p.135) can be contrasted with systemic management discourses as externally focused on practice, as well as the purposes, requirements and audiences which characterise practices in the world of work. Facilitating learning to improve practice therefore implies a discourse that requires consideration of the use of various methods and tools, as well as how problems are thought about, how others are engaged in developing knowledge about problems, and issues of power in the external world of work. Facilitating learning of an academic discourse would include, for example, academic writing, building arguments, trustworthiness of the research process and locating work in the broader domain of academic literature. In this context, academic success should be demonstrated by students through appropriate understanding in text which academics consider legitimate "...to produce a legitimate text, the subject should be able to select the relevant meanings and to produce the text according to those meanings" (Morais, 2002, p.560). In the context of the academic environment, these meanings should be inferred in the academic discourse which, as a consequence of the isolation of the programme, the nature of the assessment and practitioner facilitation does not emerge as a clear, consistent or dominant discourse. Many examples of students' uncertainty as to what was expected of them in order to achieve high marks in academic assignments were discovered in the data and analysis: hence this could be understood as indicating that relevant meanings were not inferred. This influences students' ability to produce legitimate text in the context of the course.

Tensions created by discursive plurality play out at the level of the classroom, whether they are within the field of management education and learning, between engineering and systemic management discourses, within the field of systems thinking or between academic and management discourses. For example, while the systems discourse offered 'new ways of thinking' to challenge habitual thinking and an alternative approach for thinking about problems, it could be in conflict with the undergraduate discipline discourse which students bring with them and the organisational discourse of the

environments in which students worked. These aspects can account for the students' experience of learning events as incongruous, as reflected in student data in the empirical domain.

Roles and relationships

Shifting from a primary role of the lecturer as the authority providing information to be acquired by the student, the role of lecturers in the systems practice course was conceived by the course designers primarily in relation to designing, delivering and managing the overall pedagogic process i.e. as facilitators of the learning process. These facilitators were either practitioners (for example, organisational or management consultants) who, while having appropriate academic qualifications for postgraduate teaching, were not academics by profession; learning practitioners i.e. a practitioner who had been an academic in the field of adult learning; or professional academic staff who were involved in other duties besides teaching including research and the supervision of student research projects. While specific discussions regarding the articulation of values with respect to privileging certain kinds of knowledge were absent in the briefing sessions held with facilitators, a general focus on experiential and performative knowledge was apparent in learning activities.

Students had been directed to use facilitators, peers and authoritative sources in the form of books or articles as resources for their learning. However, the people resources were less available to students after the contact period and contact or guidance required active initiative on the part of the student. While many students responded favourably to this individual control and initiated contact with facilitators and group members to address specific needs aligned with their individual learning projects, other students expected facilitators to initiate support. Social roles (such as that of an educator or student) carry their own causal powers (Wheelahan, 2007). While these roles have been pre-structured by previous agential action and condition the circumstances in which people find themselves, they may either be enacted in different ways by those occupying the roles or may be similar to those that have gone before.

Social relationships (such as those between facilitator and student) also carry their own causal powers (Wheelahan, 2007; Elder-Vass, 2010). Many students contrasted the relationships they had with facilitators who enabled or influenced their learning with those who were not experienced in that way. These were often described in the data in terms of a recognition of compatibility with the style and input of particular facilitators. These connections with the facilitator can be seen to be conditioned by relations of class, gender, race and socially constituted dimensions of privilege and advantage (Wheelahan, 2007) and hence created more favourable conditions for access for some students.

The grounded theory analysis identified phenomena as evidence of students exercising agency in the academic context. Students used their own personal powers to mediate the structural influences and make decisions regarding their actions.

7.2.2 Work Environments

Work-based reports formed a significant part of the assessment and included requirements that students build theory relevant to their specific contexts, as well as design and implement interventions appropriate to their areas of responsibility and authority. In the empirical domain, as indicated in the grounded theory, the ability to learn successfully was influenced by these contexts. As pre-existing social structures have the potential to create conditioning effects on roles and expectations (Syed, et al., 2010), emergent properties and mechanisms in the workplace could constrain or enable the development of systems management practice in the student's work context. These are discussed below in terms of organisational culture and the role of individuals in organisations.

Organisational culture

The organisational contexts potentially provide a number of emergent influences. These impacted upon the quality of participation of students in the context of the course. Data from interviews and analysis reveal that in selecting learning events for transferability to organisational contexts, influences such as the organisational culture, organisational politics, the student's professional discipline, work functions and rank contributed to perceptions of what would work in their organisations. As Elbow (1991, p. 136), drawing on Matalene describes, each of the worlds of work "constitutes its own discourse community with its own purposes, audiences, and genres." Students learn what is valued and accepted in organisations in response to their initiatives or efforts in organisations. Senge (1990) has observed this sort of feedback as emerging properties from underlying structures in organisations. Senge's (1990) contribution of generic descriptions of systems structures in organisations which produce archetypal behaviours serves to account for recurring patterns of behaviour that characterise organisational culture.

Individuals in organisations

Within these social contexts of work, a range of responses within the work environment was provided by students. Agential power of students with less responsibility or authority in their organisations was evident when they negotiated access with more powerful people in their organisation to gain opportunities to engage with particular problems or individuals in the organisation. While these actions were sometimes influenced by relationships with particular influential and powerful people, others were motivated by their personal learning projects. Those who did not challenge the constraints of organisational culture could be described as experiencing these socio-cultural aspects in ways which are less empowering or could be viewed as conditioned by social relations of disadvantage. This limited their access or perceived access to people and problems which could be valued in the context of the course.

Authors have conceptualised the dual participation in work and academic contexts for learning as identity struggles (for example Billett & Somerville, 2004; Chappell, Rhodes, Solomon, Tennant & Yates, 2003). Any programme that includes application in work environments and is built on the assumptions that the application of theoretical frameworks in practice should be a key part of management education and development, needs to consider the causal powers of organisations in which students work. Although this study focuses on the experiences of learning within a formal academic environment and for the purpose of an academic qualification, there is an acknowledgement that students in this environment have particular stories of identities which may impact on how and what they learn and their ability and inclination to approach problems systemically.

Elder-Vass (2010) says that the emergent causal powers of an organisation cannot be eliminated from explanations of how people act in their roles at work:

> *When a role incumbent does act in a role, she adopts behaviours that have been specified by the organisation, as a result of acquiring a normative belief or disposition: the belief that role incumbents ought to act as specified by the norms that make up their role.*
>
> (Elder Vass, 2010, p.158)

For example, a student with two years of work experience as an engineer found that, in order to solve the problems he encountered in working with technical design, a heuristic approach was considered appropriate. These problems were viewed as complicated rather than complex by more senior colleagues. Although student work environments could be viewed as complex social environments and could present socio-technical dilemmas that would benefit from interdisciplinary and integrated knowledge to improve their situation, the interview data indicated that there were those who perceived themselves as not always in a position to influence or control these properties in their designated roles and functions in the organisations where they work. The way the system is considered is as a subjective construct. This implies that the process of making boundary judgements is informed by the interest and level of influence and/or authority of the participating actors. This means that the system should include all variables that could be sufficiently influenced or controlled by the participating actors (Gharajedaghi, 2011). Without the requisite authority or agential power over the selection of complex problems for their assignments, students run the risk of applying what they learn inappropriately or producing trivial outcomes through drawing simpler boundaries for designing their interventions.

In summary, concepts explained above are illustrated using Figure 7.2. This diagram represents an application of the model for explanatory social science as proposed by Danermark et al. (2002) and described in chapter 3 (section 3.3.3). Danermark et al. (2002) presented a 1994 study by Roman as an example of how to use their method. This example was drawn on for Figure 7.2.

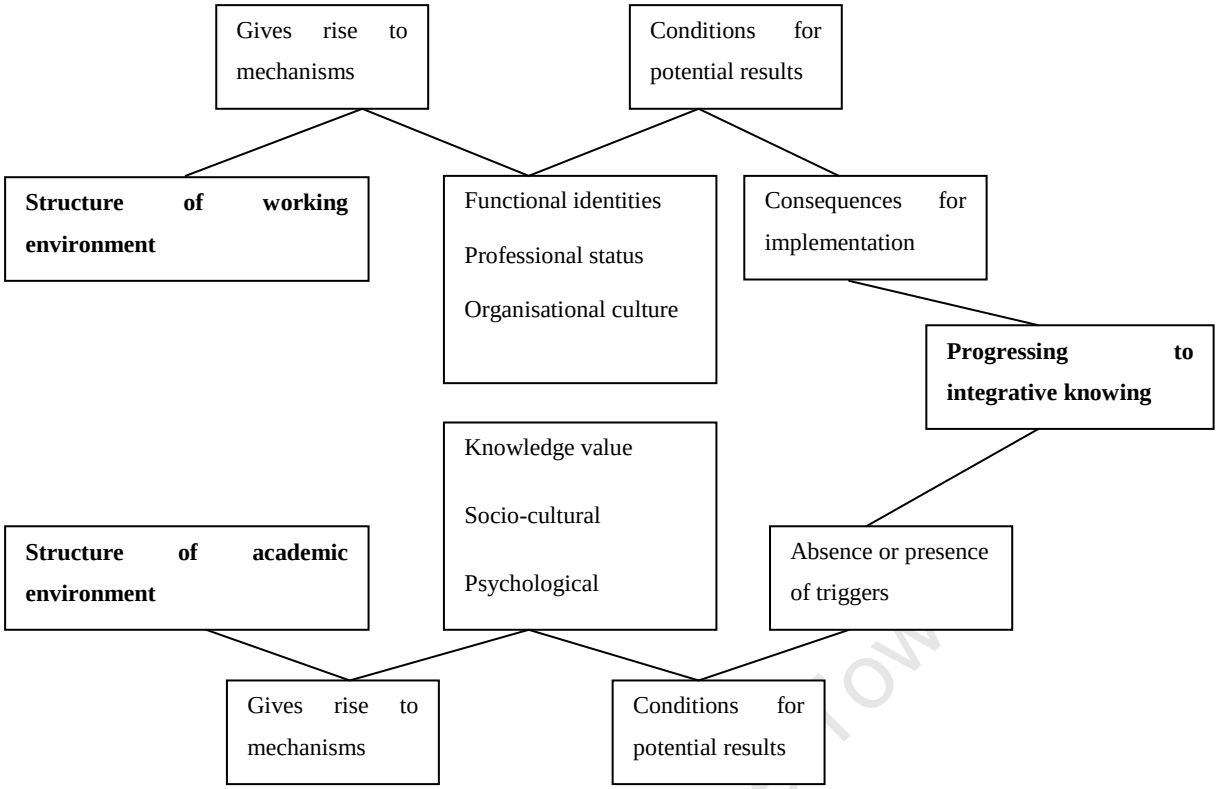


Figure 7.2 Illustration of analytical division of possible causal components

Figure 7.2 can be read from left to right, where the structures of both the work and academic environments give rise to mechanisms which produce the phenomenon.

Stage 1: The phenomenon has been identified from grounded theory as phases of progress to integrative knowing.

Stage 2: Socio-cultural mechanisms were chosen as aspects for further examination from a range of potential causal components. This selection was based on the codes and phenomena that emerged from the grounded analysis. The mechanisms were partly located in working life and partly in the academic environment.

Stage 3: Using the phenomena from the grounded theory as a starting point, theories were chosen to answer the question of *what socio-cultural mechanisms at a structural level could account for the enhancement or constraint of progress to integrative learning*.

Stages 4 and 5: Guided by the grounded phenomena presented in chapters 4 and 5, emergent properties such as discourse, organisational culture and professional status were identified in the work context; while socio-cultural mechanisms and knowledge value were used to explain the academic environment.

7.3 Implications for Pedagogical Practice

During the period of this study, an epistemological and cognitive emphasis was apparent in the course design. This was evident in the learning objectives, pedagogical approaches and course activities (see chapter 3). Although this approach achieved a measure of success as evidenced from student results, anecdotes from course facilitators and grounded theory phenomena constructed in this research study, the particular demands of systemic management practice were not always met. This directs the research towards recommendations which retain the focus on individuals as agents influenced by epistemological and cognitive approaches while also considering the conditioning effects of the social environment.

The response to the final research question: *what are the implications for pedagogical practice i.e. designing and managing events for learning systemic management practice* is discussed here by drawing on the constructs established in previous sections and chapters.

7.3.1 The need for differential teaching and learning design

In the quote below, Wheelahan sets a huge task for educators, challenging us to work in a way that is mindful and theoretically informed and not to conflate the individual and society in pedagogy:

> *Pedagogy needs to take account of individuals' life experiences, how these experiences have shaped them, their desires and aspirations, and their developing sense of identity and agency. ...However, understanding individuals' experiences in this way also requires an understanding of how these experiences have been conditioned by social relations of privilege and disadvantage. This is why we need to theorise the relationship between the individual and society, rather than reducing one to the other.*
>
> (Wheelahan, 2007, p. 195)

In order to propose recommendations for change, some consideration needs to be given to what can be changed. The programme and course designers have access to the managers of organisations only in their role as students on the programme and have no direct influence on the environments in which they work. They do, however, as academic staff, have significant influence on the design of the course and the programme. The proposals for change will therefore be directed at this level.

Gharajedaghi (2011) offers a reminder that 'design' approaches in systems thinking refer to approaches which strive to make the beliefs, assumptions, and expectations explicit, with the assistance of constant monitoring and examination. Denyer, Tranfield and van Aken (2008) describe one such design framework as CIMO-logic, in a "class of problematic Contexts, use this Intervention type to invoke these generative Mechanism(s), to deliver these Outcome(s)" (p. 395-396). This framework will broadly inform the recommendations described below.

Firstly, to facilitate progression of individuals through interpretive phases of the learning of systems thinking, the intervention proposed is to design and manage the learning process as a learning system. Bawden (1995) and Lengnick-Hall and Sanders (1997) take this approach. Drawing on Ashby's (1956) law of requisite variety, Lengnick-Hall and Sanders (1997) propose that the variety presented by students entering the learning system should be matched by the variety offered by the learning process. Lengnick-Hall and Sanders raise a hypothesis as repeated below, which they answer by proposing high-variety learning transformations; and acknowledging that the students have roles as co-producers in managing diversity and complexity:

> *Consistent, high quality in terms of student products and student reactions (outcomes) can be achieved despite high variety in students as inputs if the pedagogical and structural variety in learning activities (transformations) is sufficient to counter the demographic, preferential, and behavioural variety of students (inputs).*
>
> Lengnick-Hall and Sanders (1997, p. 1337).

Kay (2002), in addressing the design of variety in the learning process, refers to the impossibility of anticipating the triggers for change for each student. In his view, the design therefore has to incorporate a variety of dynamic elements.

For the design to enhance student learning of systemic management practice the "triggers" should facilitate progression through interpretive phases. For example, to trigger the *Starting out* phase, systems thinking concepts should challenge conventional ways of thinking and knowing and promote sense-making. Variety could be introduced through the design of pedagogical activities that include group engagement and reflection activities as supported by the findings presented in chapters 4 and 5. Critical learning systems (Bawden, 1997), as discussed in chapter 6, offer a theoretically informed approach to constituting groups to promote learning, meta-learning and epistemic learning.

Secondly, to address the relationship between the individual student and emergent properties of the learning environment, Kay's (2002) position as outlined in chapter 6 of this thesis, as well as Clegg and Ross-Smith's (2003) position, are adopted. Kay argues that the educator's focus for change should be the environment, which should provide cues for change, afford opportunities for reflection and be controlled by the student, rather than change the student. Kay (2002) suggests that we consider the educational environment "in terms of different forms of triggering agencies" (p. 524). This is supported by the view put forward by Mingers (1991), that while external or environmental factors may contribute triggers for engagement, the recognition of triggers is dictated by the structure of the nervous system of the individual.

Clegg and Ross-Smith's (2003) view that agents need to accept discursive plurality could guide facilitators towards acknowledging the possibility of these differences for the purpose of working towards facilitating complementary rather than contradictory facilitation processes.

Finally, in their discussion of the impact of socio-economic and educational differentials between population groups in the South African context, Scott, Yeld and Hendry (2007) note that:

> *Traditional educational structures and approaches will favour the 'traditional' student groupings around which they evolved.*
>
> Scott et al. (2007, p. 41)

By implication, less traditional approaches, will favour less traditional student groupings. The challenge is therefore not to swap one approach for another, but instead to embrace pedagogic and structural variety as indicated above.

Concluding remarks

The theory developed offers the explanation that, while the course provides opportunities for legitimate development as intended by the course designers, socio-cultural conditions have a significant influence on student success. Structural properties, such as the discourse of the field of management education and research, have generative causal powers that could enable or constrain action. These become realised when students respond to them. Other variables, such as the student's discipline background, together with the roles and culture of the organisation in which they work are shown to be powerful in influencing their development when these variables become activated.

The consideration of the implications of these influences on pedagogical practice is presented as an argument for the need for differential teaching and learning design. These proposals identify possible changes that could address the more general concerns that were raised pertaining to management learning and those aligned with developing systemic thinking.

The contributions presented in this chapter provide answers for the research questions by describing student experience in the synthesis of the grounded theory phenomena, explaining emergent properties of generative mechanisms and considering implications for pedagogical practice. The answers to the research questions are addressed in more detail in the concluding chapter that follows.

Chapter 8 Conclusions and recommendations

Introduction

Sowden and Keeves (1988, p. 526) note that "any specific piece of educational research will make contributions, first to theory about educational processes, second to educational practice, and third to the planning of further investigatory activity". This thesis has endeavoured to make a contribution to the development of a theoretically enhanced understanding of the learning of systems thinking and its potential for management development. The specific purpose of this chapter is to 1) specify the contributions made by this thesis, 2) motivate recommendations based on the findings and 3) suggest possibilities for further research. To this end, the research context and concerns are revisited, and the research questions are re-introduced, with sequential responses drawing on the findings from the previous chapters. This is followed by a discussion of the implications for practice in the form of a proposal for the design and management of learning events. The chapter ends with a discussion of the limitations of the study and recommendations for further research.

8.1 Contributions made through this study

This study has explored student interpretations of learning events as their learning experience in a systems practice course and in so doing has established that the individual student, the context and relationship between student and context all influence the experiences of students. The findings explain how learning emerged as an evolving process of starting out, assimilating, knowing, and integrating and adapting different forms of knowledge. The formulation of a model addresses the first research question: *how do students experience learning events designed to develop systemic management practice?* The model developed to illustrate this process is presented again for the convenience of the reader as Figure 8.1.

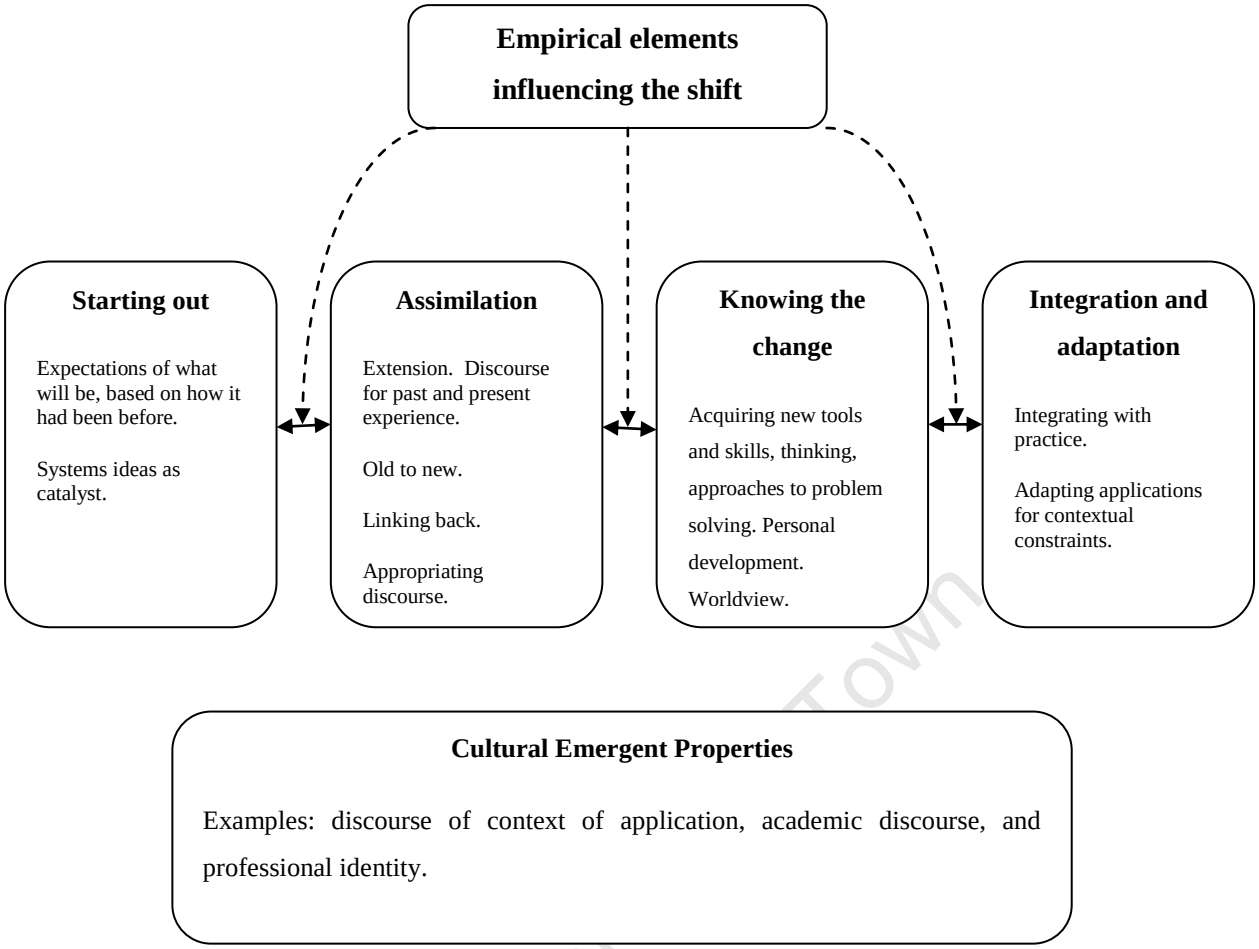


Figure 8.1 Phases in the learning of systems thinking

The model serves to illustrate that the course on which this study is based provides opportunities for learning aligned with the development of systemic management practice, such as described in the integration and adaption phenomenon. As a grounded theory, it does not account for individual experience, i.e. which of the individual students evolve through all the interpretive phases to successfully adapt and integrate systems thinking in their practice and thinking. It does, however, provide a theory that accounts for collective experience while providing explanations for the progress of some students and the lack of progress of others. This model therefore provides the basis for the design and management of a programme of events for the learning of systems thinking for management practice. It provides empirically supported claims to inform decisions on the allocation of resources to enhance student satisfaction and performance, decisions which take cognisance of the diversity of student abilities and contextual constraints in the empirical domain.

The second research question guiding this study, i.e. *what are the mechanisms that impact upon learning systems thinking and practice in this context?*, sought to provide explanations of generative mechanisms to account plausibly for the differential experience of students. As the course was found to offer opportunities for success with respect to the development of systemic management practice, there was a need to explore understandings beyond the empirical. This was done to explain the

concerns of the course facilitators with respect to the mechanistic or superficial application of systems concepts.

This contribution entailed an examination of a dynamic relationship between the socio-cultural aspects of the environment and people as agents able to uncover conditions that enabled or constrained systemic management practice. In particular, at the level of the course, socio-cultural components were argued as creating situational conditions conducive to the development of systemic thinking and systemic approaches to practice, and hence could account for students' construal of experience as success. However, the existence of dominant alternatives to these cultural mechanisms, in the form of discipline discourses and workplace cultures worked against the potential to develop systemic thinking and practice.

These explanations can inform the design of programmes of learning events and have the potential to improve the student experience of the learning of systems thinking for management practice.

The final research question, i.e. *what are the implications for pedagogical practice, i.e. designing and managing events for learning systemic management practice?*, was addressed with a proposal for the need for differential teaching and learning design. Success at the discourses of systemic management practice was demonstrated in the empirical domain as constituting transformation of thinking and effective systemic practice. This therefore informed the proposal for a design approach to incorporate requisite variety to manage the diversity in terms of context and students.

In addition to the significance of these findings for an academic context, the findings suggest applications for management practice. By identifying potential organisational and professional constraints, this study contributes explanations for issues regarding the extent of adoption of systems thinking in organisations, such as those raised by Ackoff (2006) in his article "Why few organisations adopt systems thinking". Furthermore, it establishes a basis for understanding what is needed for organisations to support the development of systemic management practice. These explanations could therefore inform potential action to address these challenges.

The contribution of the learning of systems thinking as an evolving process, influenced by contextual factors, raises the following matter for consideration, that is, the potential for accessibility of systems practice by managers is more complex than the self-marketing approach proposed by Ackoff.

8.2 Limitations of this study

As the research project progressed, a number of insights were generated with respect to the consequences of the deliberate limitations imposed by the research design and in the execution thereof. These will be discussed below with specific reference to 1) the philosophical choices, 2) methodological choices and 3) theory development.

8.2.1 Philosophical choices

Critical realism provided a set of assumptions that allowed for an understanding of reality and a methodological contribution that facilitated possible accounts of how people come to prefer particular knowledge forms and assumptions. Furthermore, how they learn and what they learn and their ability and desire to take action. In the application of the methodological formulations of critical realism the scope of possible explanations required deliberate decisions as to what to pursue for retroductive explanation. In the critique that Mingers (2006) offers on critical realism, he characterised the retroductive process as having potential to generate a "proliferation of possible explanations" (p.28) that may be difficult to refute or test. Although adherence to methodological techniques were attended to with due regard to the accuracy of explanations of generative mechanisms, the choices made (for example, to limit explanations to socio-cultural aspects) limits the potential extent of the explanations.

The notion of a domain of reality that is independent of our observations with emergent properties that has power to condition our experiences is a contribution of critical realism that resonates with critical approaches in systems thinking. These theoretical constructs allow for multimethodology approaches to research and practice and served to support the integration of the components of this research design. However, this notion of a stratified reality also assumes an analytical separation of society from the individual, as structure and agency, which has exposed critical realism to critique from a number of sources (Cruickshank, 2010). Harré (2009) adds to the critique of critical realism with a detailed argument where he presents the 'defects' (p.129) in the philosophical foundations of critical realism as the means to "recover the intent of critical realism" (p.129). While these will not be discussed here, the import of Harré's (2009) remedies is a positive one, that celebrates the possibility of humans as active agents that can realise their projects with others. Harré (2009) states that human beings "can come to realise that the constraints that society seems to place on their worth are grammatical" (p.142).

Bhaskar accepts the fallibility of critical realism, making reference to critical realism as the "best explanation so far" (1979, p.6). A limitation, therefore, that is of consequence to this or any research study adopting critical realism as an ontological framework, is that the criteria for the judgement of truth claims would entail correspondence theories of truth where "knowledge in the transitive domain

in some sense corresponds to its objects in the intransitive domain" (Mingers, 2006, p. 28). As the intransitive domain cannot be known, consensus theories of truth are also required.

8.2.2 Methodological choices

The combination of the repertory grid technique as a structured interview technique for collecting data, with grounded theory analysis, resulted in a process requiring repeated trials in order to produce the methodological design for addressing the research questions. This approach necessitated a limitation of the sample size in favour of in-depth qualitative data and findings. The repertory grid technique for interviewing proved to be very useful as a structured interview process that provided a framework for students to reflect and discover insights. In addition, it reduced the possibility of the influence of the researcher to direct the interview. While there were many options available for analysis of the repertory grid data, the transcripts of the discussions supporting the choices of repertory grid elements and constructs, as well as the laddering process, provided rich data for the grounded theory analysis. The choice of grounded theory as the primary analytical approach provided a qualitative range of experience that informed the choices for hypothesising generative mechanisms which could account for the empirical observations. While foregrounding repertory grid analysis has potential for useful comparisons between individuals, foregrounding grounded theory, as conducted in this thesis, provided the means to analyse collective experience and hence develop theory that incorporated contextual and agential experiences.

One of the key principles of grounded theory is that the research study is not initiated by *a priori* hypotheses to test. Instead, grounded theory studies are usually motivated by the need to generate concepts to explain actions in relation to particular events and are used to produce rather than test hypotheses. In terms of meeting the scholarly requirement of producing new knowledge, one has to start with the motivation that new insights will be produced from the study as opposed to identifying the nature of this contribution from the start. While this approach may appear intimidating and risky, it is consistent with the ontological view offered by critical realism of a world that is open, dynamic and changing (Lawson, 1998), where empirical regularities are rare (Sayer, 1998). However, Lawson's (1998) recognition that certain mechanisms may, within the constraints of time and space, be reproduced continuously, challenges the researcher to pay attention to the range of factors impacting on mechanisms and to exercise care in the processes of abstraction in order to produce plausible and representative theories. The benefit of such attention is captured in the view that the task of science is not only "to detect new social events or activities, but to reconstruct (and detect) the preconditions for these well-known situations to be possible" (Danermark et al., 2002, p. 103).

In grounded theory, the impact of long periods of uncertainty without an established conceptual protocol to follow requires, as Pandit (1996) puts it, commitment and faith in the process. Particular qualities, such as creativity, confidence and experience are demanded of the researcher (Pandit, 1996).

Glaser (1978) acknowledges that periods of uncertainty may have the consequence of psychological depression for researchers. Anticipating the potential of such human and personal impacts on the researcher highlights the importance of seeking access to appropriate support to mitigate chances of these factors becoming a limitation in the research process.

8.2.3 Theory development

With grounded theory as the primary methodological choice, a number of limitations constrain the theory development process. In producing concepts, the grounded theorist is initially limited by her language, which may at the outset be derived from common use, or layperson's language. When checking these against extant literature, concepts are likely to be part of a discourse within a complex theory with well-defined boundaries which provides the context for those concepts. In pursuit of effective theory building, these concepts need to be presented with a coherent etymology, while not necessarily seeking to make a contribution to the theoretical field or discourse from which it was drawn. In this regard, Locke (2001) illustrates the point that the literature that is relevant to tell the story of the conceptual elements of the empirically developed grounded theory may not be the literature to which the theoretical contribution of the theory is directed.

In addition, the process of defining and redefining the codes was very time consuming. Furthermore, developing concepts that evolved from the initial codes, which were, as expected in the grounded theory approach, abstracted from empirical data, also took time. This process could possibly be expedited by designing efficient systems for managing and categorising the data at the outset of the research process, rather than these data management systems emerging as an unplanned consequence. In this study, a coding system was developed while working with the data. This facilitated the management of data and the emerging codes.

The significance of taking a critical realist stance was that it provided a framework for hypothesising generative mechanisms that could account for the categories and the relationships between them that were developed in the grounded theory process.

8.3 Recommendations for further research

8.3.1 Framework for the design and management of learning event programmes

Any curriculum is limited by time and resources, challenging course designers to prioritise certain content over others, and to adopt particular pedagogical practices over others. In addition, there is a challenge to be innovative, and address questions such as: how can one achieve complex objectives in different ways? The preparedness of students is a factor which impacts on curriculum design and study and is one which requires further study. In this study, an integrated theory for the learning of

systems thinking was sought as explanation for possible dimensions of experience for inclusion in the grounded theory.

In the process of working with this thesis, many more ideas and possibilities emerged. Some of these are offered below as areas for further exploration:

- Exploring students' innate understanding of systemic thinking prior to commencing formal management development programmes;
- Case studies of systems practice in work environments for students participating in management development programmes;
- Longitudinal studies to explore the extent to which the change that was experienced is sustained, and whether the change develops or retreats;
- Exploration of a relationship of the assumptions and values of course facilitators who design opportunities for learning and student learning, as Sterling (2003, p. 338) echoing Bateson notes, "our individual and shared paradigm positions directly influences the set of possibilities that we consider and use in any practice, whether or not we are conscious of this influence". It therefore follows that holistic, systemic assumptions and values are a prerequisite for designers and facilitators of programmes that incorporate systems thinking as a world-view.

Concluding remarks

Postgraduate management education has been associated with economic and professional mobility, as well as access to migration prospects via opportunities with highly skilled jobs, providing more options for graduates with these qualifications within South Africa and beyond. With the recruitment strategy of the programme of interest in this study, people seeking these opportunities also have a discipline background, such as an undergraduate qualification in engineering.

In the analysis in this study, these backgrounds have been shown to have the potential to influence learning for management development. Although the analysis was primarily focused on interpretive experience in the empirical domain, the consideration of emerging properties, such as discourse, provided a plausible account for conditions that do not determine but can influence experience and academic performance.

The grounded theory analysis of student learning on the course showed the possibility of the experience of learning events contributing to "a movement of mind" (Senge, 1990, p. 3). In this context, these movements, as well as other change and the phenomena which precipitate them, involve systems thinking and practice.

The potential of the systemic design of a course, such as the one in this study, to contribute to transforming structural constraints is arguably limited. However, taking the approach to designing an environment where learning events facilitate students' ability to take account of these, thereby promoting of agency, is the one proposed in this study. The intention is to contribute to enhancing student learning, improving the possibilities of thinking systemically and applying systems ideas as part of systemic management practice.

However, Sterling offers a word of caution to learners and to educators; "While we can learn our way to the future either by *design* or by *default*, it is only the former that carries hope and creative possibility with it" (2003, p. 358, emphasis in text).

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Appendix A: Literature Summaries

A1: Summary of Systems Approaches

Table A.1: Systems Approaches to Research and Intervention (Adapted from Jackson, 2000).

Approach	Assumptions	Associated Systems Traditions
Functionalist	Systems appear as objective aspects of a reality independent of us as observers.	Organisations-as-systems
		Hard Systems Thinking
		Systems Dynamics
		Organisational Cybernetics
		Living systems theory
		Autopoiesis
		Complexity Theory
Interpretive	Systems as the creative construction of human beings. Accepts that multiple perceptions of reality exist.	Warfield's Interactive Management
		Churchman's Social Systems Design
		Checkland's Soft Systems Methodology
		Senge's Soft Systems Thinking
		Soft Operational Research, Soft System Dynamics, Soft Cybernetics.
		Generic Interpretive Systems Methodology
Emancipatory	Seeks to reform current social order.	Emancipation as Liberation
		Emancipation as Discursive Rationality
		Emancipation through the Oblique use of systems methods
		Generic Emancipatory Systems

		Methodology
Postmodern	Seek through methods such as deconstruction, to reclaim conflict and to ensure that marginalized voices are recognised and heard. Aims to ensure diversity and encourage creativity.	PANDA (Taket and White,2000)
		Postmodern Systems Methods
		Generic Postmodern Framework

A2: Adult Learning Theories and Definitions

Table A.2: Summary of Adult Learning Theories (adapted from Merriam, Caffarella and Baumgartner, 2007; Amstutz, 1999; and Fenwick, 2001, Tusting and Barton, 2003 and other primary authors)

Derived from ...	Learning Theory/Perspectives	Definition (examples)	Main Proponents	Key idea/ Paradigm	Critiques
Psychology	Behaviourist	Learning is a change in observable behaviour.	Thorndike, Skinner, Holt etc (Ormrod, 1995).	Production of standardization e.g. set of competencies with little variation from one person to another. Learners conform to the views, attitudes and behaviours of dominant economic and social groups in society (Amstutz, 1999, p.22).	Privileges particular types of knowledge while marginalizing others. Does not consider social elements of learning and agency.
	Cognitive	"Learning involves reorganisation of experiences in order to make sense of stimuli from the environment" (Merriam et al., 2007 p.285)	Piaget Bruner Gagne	Learning focused on the mental and psychological processes of the mind, not on behaviour (Amstutz, 1999). Motivation to learn emanates from the learner.	Does not include social aspects of learning.
	Humanist	A form of self-actualization-leads to personal growth and development.	Maslow and Carl Rogers (Merriam et al., 2007), Knowles.	Affective and cognitive dimensions. These theories also focus on individual development but in a way which is learner centred.	Focus on agency i.e. humans have free will, choice and ability to act, and take an active role in their learning. Exclusion of the role of structural elements in constructing meaning and knowledge.
	Developmental (includes what	Construction of knowledge by organising and making meaning	Perry (1970)	Stages of cognitive development (primarily developed from studies of	Linear progression through stages

	Merriam et al., 2007, refer to as linear and categorical models of adult cognitive development).	of experiences and construction takes place in context of assumptions about what constitutes knowledge and role in creation thereof. (Baxter Magolda, 1999). These assumptions change in development.	Baxter Magolda (1999) King and Kitchener (1994) Kegan (1994)	university students). Generally moving from absolute judgements to more relativistic views of knowledge.	irrespective of context.
	Social constructivism	"Learning is a process of constructing meaning; it is how people make sense of their experience" (Merriam et.al., 2007, p.291)	Vygotsky in Wertsch (1991) Bruner (1996)	Social relations underlie individual development. Zone of proximal development (ZPD) - gap between individual ability and ability through support in learning. Much of the field of adult learning is constructivist in nature (Merriam et.al. 2007).	Has been criticised for presenting experience as overly deterministic, and the link between experience and knowledge presented as overly cognitive (i.e. reflection as a mental activity), and failing to "acknowledge the discursive production of experience" (Fenwick, 2001, p.25).
	Situated cognition	"Knowing and learning are defined as engaging in changing processes of human activity in a particular community" (Fenwick, 2001, p.34).	Lave and Wenger (1991).	Learning embedded in social participation. Context of learning is central to meaning making.	Does not acknowledge that different kinds of knowledge possible which can be transferred from one context to another. Learning in authentic environments may enforce negative learning practices (Fenwick, 2001).
Adult Education	Androgogy	"The art and science of helping adults learn"(Knowles,1980, p.43)	Knowles (1968)	An attempt to distinguish adult learning and education from that of children.	A number of criticisms, some which question whether it is a theory at all. Others cite a lack of evidence of difference between education and learning in adults and children. Focus on individual learner to exclusion of

					sociohistorical context.
	Self-directed learning (humanist roots)	"The construction and reconstruction, exchange and negotiation of significant, relevant and viable meanings" (p.2).	Thomas and Harri-Augstein (1985) Candy (1991) Tough (1971)	Adults are considered to plan, conduct and evaluate their own learning. Learning as sense-making. Adult drives learning, assumes primarily responsibility (and sometimes control) for own learning.	Focuses on individual learning not social context in which learning takes place. Agency without structure.
	Informal learning	Spontaneous unstructured learning that takes place as part of living, without an imposed curriculum of either formal or nonformal educational programmes.	Coombs (1995), Illeris (2004), Boud and Solomon (2003).	As it is embedded in everyday activities difficult to identify as learning. Often categorised based on intentionality and awareness. Includes intentional, unintentional and self-directed.	As this form of learning takes place as directed or experienced by individuals in the absence of a formal curriculum, the theories are descriptive and particular theories are critiqued rather than the phenomenon of informal learning e.g.
	Enactivism	"learning refers to a transformation— one that expands the learner's potential range of action" (Davis and Sumara, 2001, p.89). Learning can be occasioned by disturbances which become amplified, leading to emergence of new patterns.	Davis and Sumara (2001)	Complexity theory considers learning to be a complex interaction of knowledge, phenomena, events, activity, community and actors which are mutually dependent, mutually constitutive with emergent outcomes (Davis and Sumara, 2001). Includes both cognitive and affective aspects of the individual and connections with others.	Morrison (2008): a descriptive theory that is easily misunderstood as a prescriptive theory, silent on key issues of values and ethics that educational philosophy should embrace, of questionable internal consistency, and of limited 'added value' in educational philosophy.

	Reflective and experiential models	Malinen (2000) argues that there is no single definition as the theoretical and philosophical foundations of experiential learning are fragmented and confusing. All descriptions involve cognitive reflection on concrete experience. Kolb 1984: Learning is the process whereby knowledge is created through the transformation of experience.'	Kolb (1984), Mezirow (1991), Revans (1980), Boud and Walker (1991), Schön (1983).	Related to many other concepts of learning e.g. self-directed.	Models simplify reflection portraying it as a cognitive activity; decontextualises experience and reflection; failure to acknowledge "discursive production of experience" (Fenwick, 2001, p.25); "colonization" (Fenwick, p.24) of people's experiences in academic discourse. Critiques of Kolb's learning cycle have seen derivatives which include considerations of affective domain (Boud, Keogh & Walker, 1996); considerations of context and power (Jarvis, 2001).
Related to constructivism	Transformative Learning	"The process of using a prior interpretation to construe a new or a revised interpretation of the meaning of one's experience in order to guide future action" (Mezirow, 1991, p.12).	Mezirow (1991)	Assumptions and beliefs and examined and changed. An individual process taking place in a social context.	Often portrayed as a linear process involving a number of steps many of which were not confirmed by empirical studies (Taylor, 1997).
	Critical and Postmodern perspectives	The process of learning is the coming to awareness or concientization of one's own implication in one's oppression (Foley, 1999).	A number of derivative works drawing on Paulo Freire (1970), Marxism, Habermas etc.	Critique of economic and social structures and power dynamics (Merriam et alet al2007)	Critiques from many perspectives (Fenwick, 2001). Described by Kellner (1995) as overzealous in cultural critique and reconstruction portraying a monolithic dominant ideology with people as passive, potentially non-critical victims of this ideology.

A3: Reflective Judgement Model

Table A.3: Summary of Individual Levels of Reflective Judgment Model (King & Kitchener, 2004)

Stage	View of Knowledge and Justification of Beliefs
1	Knowledge is absolute and authorities' views are accepted, justification is not necessary.
2	Knowledge is still absolute but not immediately available to the individual, justification can come from somewhere, and someone has it.
3	Acknowledges temporary uncertainty, but absolute truth still possible, justification on accumulation of evidence leading to absolute knowledge.
4	Knowledge has become permanently uncertain, reliance on idiosyncratic justification of knowledge claims.
5	Knowledge has become permanently uncertain; rules of a particular context are used to justify beliefs.
6	Knower plays a role in the construction of knowledge, elements of evidence used for justification.
7	Knower plays a role in the construction of knowledge, evidence synthesized into a coherent point of view of validity.

Appendix B: Data Collection

B1: Confidential Rating Elements against Constructs

Respondent: MM03 07

Date: 03 December 07

1. Rating Elements against your Constructs

Elements

Collecting data (Accounts of): CB's lecture
Using the paradigms (Space Shuttle Failure lecture)
Viable Systems Model
Position Paper
NGO education project
Concept of 2nd Order Intentionality

Constructs

Rate the elements against the constructs as illustrated in the example below:

Example: Rate Collecting data/Accounts of as 1 if it is extremely making sense of the situation/mess – or 5 if it is extremely about how to deal with requisite variety and organisational viability

making sense of the situation/mess - requisite variety /viability

1	2	3	4	5

Including stakeholder perspectives to get it right own assumptions

1	2	3	4	5

Clarity of problem situation Answer/consequences

1	2	3	4	5

Open ended Drawing conclusions

1	2	3	4	5

Using own ideas (think out of the box) Not interesting

1	2	3	4	5

Felt like I owned it Problem dumped on me

1	2	3	4	5

Hinge moment stand point already taken

1	2	3	4	5

Construct	**Element Rating**					
	CB	PARADIGMS	VSM	PP	NGO exercise	2nd ORDER
collecting data to make sense of the situation/mess – how to deal with requisite variety and organisational viability						
Need to include stakeholder perspectives for relevance in order to "get it right"- Using own assumptions so could "get it wrong".						
How to get clarity of problem situation- answer to problem and critique and consequences when dealing with problem.						
Understanding someone's vision and goals (Open ended)- how to see through all the research and data given to draw conclusions						
Using your own ideas and thinking out of the box- not as interesting						
Felt like I owned it- problem dumped on me.						
Current/hinge moment- stand point already taken/ decide right or wrong in going about solving it.						

B2: Examples of biographical sketches

Cohort 2 Interview 1: Interviews prior to the systems practice contact week

Case 1: Jodie

Jodie had the least work experience of the cohort, having worked for little over a year after graduating as an engineer. The elements listed as learning events either described formal learning contexts or guided learning. Jodie preferred learning environments where the delivery was facilitated by a knowledgeable, enthusiastic facilitator. He valued practical examples or methods which assisted him in application of knowledge content.

Case 2: Lilly

Lilly had just more than two years work experience with little practical experience in a management position. The learning events elicited focussed primarily on tasks assigned in the work environment. Tasks which allowed lateral thought and independent contribution were preferred over regimented tasks, and while Lilly sought challenges, these produced anxiety if information was not known.

Case 3: Thabitha

Thabitha had in excess of 10 years working experience post graduation (Bachelor's degree) which included management roles and consulting. She is currently a partner in a consulting business. The learning events noted by Thabitha included those from structured and unstructured contexts, including formal learning contexts, guided learning in work and study environments, learning through experimentation, learning from theory. Thabitha adapted to a number of different learning environments acknowledging different ways of learning without revealing preferences to particular facilitation although she found little value in facilitators who delivered lectures by "standing in front and talking".

Case 4: Wayne

Wayne had in excess of 10 years work experience. His learning events were located as self-study situations and social situations which contributed to seeing things in a different way or changing personally.

Case 5: Butro

Butro had worked for more than two years after graduating as an engineer. The learning events noted by Butro were primarily critical incidents located in his work environment. The learning described was in response to incidents with unexpected consequences.

B3: Sample interview transcripts

Notes on transcription conventions and abbreviations

1. The names used by the interviewee identifying course lecturers or students have been edited out or replaced with pseudonyms to protect the identities of both the interviewee and individuals.

2. Conventions:

[] Name replaced

… Short pause in speech, or trailing off of sentence

B3.1 Sample Interview: Cohort 2 Interview 2: Post contact lecture week

INTERVIEWEE - Thabitha

TAPE FOUR – 30 May Qualitative interview, after observations during contact week.

SIDE A

Interviewer	Can you describe a typical day during the contact week
Interviewee	Okay, for me the typical day was three different kinds of days, but typical day for, or the day I'll describe was the ones with the systems thinking, so, Monday, Tuesday, Wednesday, Thursday), we arrived quite early we had to be here at seven thirty, and the first two hours were preparation work, so he, [course convenor] would give us the work we needed to do and we would sit and work through those, it was quite intensive, before you knew it your two hours was over, nine thirty the lecturer, [lecturer A] would come in, and most of the time he'd lecture for about an hour and gave us a bit of work and then he'd come back and lecture some more, ...I find it very intensive, he'd leave at about twelve thirty and the rest of the afternoon was group work and usually work till four o'clock, five o'clock and we still weren't finished with what we were doing, so it took a lot of work, a lot of energy, we sat together in groups we worked together in groups in the afternoons, well, most of the day, ja, but the group was specifically was the afternoon and for me it was a very tiring, was a lot of energy sapping I guess it was because we were learning so many new concepts, you know, unlearning and relearning that causes the tiredness,…
Interviewer	What was your experience of the course content?
Interviewee	The Systems Thinking bit or the whole lot.
Interviewer	The whole week, for contact week
Interviewee	I think that the stuff [lecturer B] did on Sunday about the groups I kind of feel that she, it was a short time with us, I think we, we kind of heard the concepts but it wasn't enough to internalise it or to get to grips with what she was saying, the systems thinking was a lot more practical, it was a lot of work, it feels as though we worked constantly and it wasn't a lot of lecture time at all, although there had to be some kind of information but the reading was part of our information input, I enjoyed that a lot, it was quite, it was different, it was a, it was hard work, but it was quite, quite a lot of learning for me, that section in that bit, [lecturer C's] two days with the collaboration it was just a different mind-set, I was, it was a different type of learning, it was a lot less practical work a lot of listening, a lot of, little things a lot of reflection as well, as to time, as to what we were listening to, what we would do in our work, so that to me was quite , I could tie it to a lot of things back at the workplace, but I still think that a bit tired or rather tired at that point so it's a pity that we didn't have enough energy to engage, so I think we lost a little bit from the learning side, because we were tired and because we didn't have sufficient energy so I, you know, in a sense I feel a bit of disappointment, I feel I wish I was feeling better, more energetic so that I could do a bit more, so I think there is a lot more I could've gotten out of it, ja

Interviewer	At this point in time, can you describe those elements of the course that you can immediately apply to your work environment?
Interviewee	The bits that we did with the causal loop diagram, that for me , I've been struggling with a problem that we've had recently or that I've been met to deal with recently, and , I think that's something that I would, going to take all the data that I've collected, cause I'm sitting with all this data, and was kind of feeling just before this course, now what, what am I going to do with this data, suddenly like, aaaaa, I got a structure, go a (laughing), I got something I can use to take this data, and use it, so yes, I do I think there is a lot of stuff not only at that workplace, but at my own company as well, that we could use this sort of thing, we other thing I found very interesting, [lecturer C] was talking about, I was talking, and just talking through the air, that's why we don't really make commitments, I kind of think a lot about our meetings are like that, which just talk, occasionally somebody takes minutes , we kind of get to some kind of an agreement, at the end he'll go off and do some stuff and we always feel that he does his way thingy, anyway, but it's because we just don't, our minds are not converging it you know, so that's the reason I would think that we need go and put that into our workplace.
Interviewer	How do you see this course, adding value for yourself?
Interviewee	Oooh, (laughing) in terms of, I'm just my mind is going to add lots of value, it's going to change my life (laughing), but I can't quite define it, I think last night I was saying, how am I going to make this course change my life, so that's (laughing) actually where I want to go, you know I think it's just a different way of thinking and it's also the biggest bit that I see happening that it opens up your mind looking around to bigger things and not getting caught out with what you're doing and where you are at that point in time, such a sea of things , one to another (inaudible, laughing) to see things from a, from a broader prospective, okay, I, I'm not sure yet, where it's going to go, but but that is where I'm looking (laughing)…
Interviewer	Having just completed the contact week, how would you change the structure of the course, or the contact week to make it more effective for your learning?
Interviewee	I think the biggest thing for is the tiredness, and I realise that some, you know working hard and, and, and putting your mind to it and being and or focussing on just this specially but no energy or time to think of anything, is a learning in itself, but I think that the length of the days or even you know, you know because the length of the days you can do it for a specific time or you can do lots of days, like we've done nine full days , and I find that when you're very tired like the last bits, you are not as, , you don't absorb as well, or it's not so much as absorb, I think you don't engage as well, so you lose out on some learning's, and I think that if there was a way in which you could put some of the, the, , especially the collaborate, the collaboration projects, the last bit we've been doing if that was maybe done at another stage, it maybe be more beneficial I also think nowadays you know it's not good for you, because you come from a five days of working, and then you come in here, so it's not just nine days of, it's five, it's nine and then it's another five afterwards, so you just carry on going , so I'm not sure, for me a very structure-ish, restructuring maybe the first Saturday should have been an

	introductory where could have just gotten to know each other beforehand which didn't have to done in line with the work, , and I would have probably done it in terms of seven days as opposed to nine…
Interviewer	In terms of the preparation, the reading of the content and then being presented with a lecturer, going through the concept again, tell me about how you think this affected your learning.
Interviewee	You're talking about the mornings
Interviewer	In the morning preparation, ja,
Interviewee	I think that was actually a good idea, I liked that, I liked the fact that , if you came in, you came in fresh and started reading you had a deadline which you had to finish the weekend so it had to be done by nine thirty and you also had to discuss it , how that, we were all very focussed at that point, we all sat in groups you know, worked through it well the discussions also you get to think about it, talk about it before the lecturer comes in so by the time he comes you have a good idea of what, what he's talking about, okay, (knocking sound on tape) and also because of the morning you, you really fresh and raring to go ja…
Interviewer	You mentioned that fatigue played a very important role during your contact week, how did you deal with it, and, and what is it that you did initially that could have maybe contributed to being so tired, do you think that the way that, you could have continued with the course maybe ease off the fatigue…
Interviewee	I find it a difficult one because the tiredness or the fatigue was being caused just about being here, you come here in the morning and you work, you work through the day basically I felt we should have taken longer lunches, we shouldn't have, it's okay for the first three to four days to cut lunch for twenty minutes, but by the time it came to, fourth or fifth day I felt that at that point we we just going, going, going, , I think that fatigue definitely comes the fact that we were here from seven thirty in the morning till five at night, , you go home and even if you don't think about it for a while, when you go to bed I think that is all in your mind there, and you got to undo your old thinking, you got to rethink, you got to rearrange your thoughts and I think even during your spare time, your break because it's so much that you're learning in such a short time, your brains working, working, working, so it keeps you going I find most days, I woke up at about three and I wasn't dreaming about the stuff, I would wake up and I'd have concepts in my head and think, why am I so wide awake now, you know, but , so those things I found quite tiring…
Interviewer	Now, focusing on group work, what did you do make it easier to learn in the group process?

Interviewee	okay now what is it easier for me
Interviewer	Or difficult
Interviewee	Or difficult, okay, it's quite difficult I found from groups I've worked well in, some I find I don't get on too well with I think our groups fine, I believe that we could, we will work well together but we did too, , I think there are some dynamics that we, that we, that we had to iron out or sort out, , I'm not, I don't believe it's negative, I believe that the dynamics that is happening is part of creating a group, it's quite normal I find that the a bit temperament, but the personalities if it were, everybody has got their, will make their standpoints and nobody will hold back or no don't want to feel intimidated in a sense they don't participate, and sometimes we all stand our ground, standpoint a bit strongly, but it's okay, because that's, that's how we come to a conclusion, just need to get a way in which we shorten that process, so shorten the facts that they don't agree, and how we going to do that, I guess that's really, I think it's one of the things we going to work with, as we move forward, me, in the previous course that I've done, when we put together into the formal document I found that quite fun as well , anyway one person has to take control of who organises the route and I think that was the last group, so that is also quite nice but we haven't decided yet with our group which way we going …
Interviewer	And reflecting on yourself, your participation in the group?
Interviewee	My personality, can be quite adamant sometimes, which I think can also be negative, also sometimes, also think it can be negative, I would feel strong about something but if I'm not engaging or convincing or coming to common ground with some people, not feel totally happy and then get frustrated with, I find that when I do get frustrated sometime but I withdraw somewhat, , but it takes a while, and then I've got to kick myself and say, hey wake up, back into the (laughing), get into the group, I think that for me, that's my dynamics about the, the bad bits (laughing)
Interviewer	And how do you deal with this frustration?
Interviewee	Often for me it's just about keeping quiet for a little while allowing it to go, letting my thoughts go and then I will come back into the group, I don't, it's always just a point in my opinion if only we trying to achieve an objective we not, it's not personal, you know so it's always about just what we were talking about, it does, but it does mean that I have to reflect, doesn't take me long to, but it, and then I will move back into the group I, I don't think that I think that with the group dynamics that we've got if there was anything that was really bugging that we would be able to bring it to the group, but that's my feeling we haven't had anything as yet, so I don't know what would happen when we

	needed to do it, okay, but my gut feel is that we could, as a group we could manage it, I mean the four personalities that we've got
Interviewer	when groups are faced with a, a situation where they cannot come to a consensus the, the first thing they do they tend to bank that part of the discussion, what do you see as a danger of that…
Interviewee	If you can't come, if you need banking, my, it should be when you can't come to consensus within a, agreed timeframe, you need to bank these otherwise specially if you can't come to consensus otherwise you'll cycle and you'll just go round and round and round, you need to put it aside and move on, because when you move on you yourself will see different things because as you move on you'll start discussing other points that will affect the thinking of your previous points and sometimes you get caught into an idea or a opinion that is egotistical in a sense, so you, you stuck in an opinion because you just stuck in the opinion, okay, and you not standing back and, and opening your mind to other things and I think it's same as when you in an argument sometimes you need to just walk away, walk away for a while and come back and that's how I see banking, so you actually just walking away from the issue and you need to come back if necessary sometimes you address it another point further down the line so I think you need to, you need to bank you can't just go on cycling otherwise you'll be time wasting.
Interviewer	Now this always, you know this always adds to, to, to, to group frustration and , in this instance now how do you deal with a group member that you perhaps do not like
Interviewee	Okay I try to think of an incident as to how I would deal with it, I think if you don't like someone in the group or if there is a personality clash, then you need to draw in on some of those things that [Lecturer C] was talking to us about on Sunday, I think that we need somehow try an recognise what is it in you what's making you dislike the person and you need to, sometimes the dislike is not about the person it's about maybe mannerism or, you need to able to identify, you need to try and identify what it is that you're not liking because you have to get on, you don't have to like the person to, for the group to work but you need, you can't afford to resist or start putting in, sabotage is the word she used because you are unhappy with what's happened so you need to deal with your own, you need to try and deal with your own-selves and your own emotions and where you're going and make sure that whatever, that your emotions for that person, disliking that person doesn't upset the dynamics of the group, it's not about managing yourself then, more than, try to change the person
Interviewer	If, if, if this situation persists, how would you go about dealing with it
Interviewee	If I've checked, if, if this situation is out of hand, and you can't come to terms with the other person you would have to get in somebody else, a third person, if you can't deal with it yourself, say if you can't address with that person or try and sort out the issues

	with that person, because it's all good and well saying that if there are two people in the group that don't like each other, and the one person is trying to get past that, the other person also has to try and get past that, and I think sometimes it would need a third party to intervene, but you need to, the groups more important, the works more important so that is where I think you need to both go, the group is beginning to … and I think that I don't know, the groups got to work, it's a couple of months but I mean it can be a difficult couple of months cause we're going through hard, we going to go through hard times, even harder and learning's
Interviewer	in terms of a, a group dynamics, , , you know this is a very , you know important thing to be able to discuss, how would you, how would you advise your group in terms of dealing with this type of issues, would you recommend any form of you know, talk mean open discussing such issues upfront before even engaging in, in, in formal activities would you recommend a method that the group must , take in terms of dealing with difficulties.
Interviewee	Upfront you need to get to some kind agreement with how you going to work, as to what times you going to set, where you going, you know but that's logistics, things about time and place and all those things, personalities take a, take time to come forth or to , to become apparent as to how the personalities are going to get, get on get in terms with with each other, when there are issues, or if you realise there issues you need to address it as soon as possible, so, as soon as you know that something is happening or some dynamics is not working for you, you need to be able to say, I'm not sure, you know it also depends on how the people feels with whether that person is open to the group, to talk in the group about it, , I'm not sure how to make it different unless you look at each situation as it comes, because it's about team work and team dynamics and getting the group to be a community, in [Lecturer C's] words, but those sorts of things don't happen by just throwing four people together, you know, four people have got to go through a process to get there, there are processes that you can work through, we haven't done any of it here, but I've been involved in group dynamic processes before where they try to, they try to fast track community building, so I believe there are ways in which to do it, but it's also I believe that you want to embark on a learning programme you can't do it as part of your contact week, you need to maybe do a, a day or a two days, a week before you do your contact week.
Interviewer	Now, now that you are at the end of your contact week, can you describe in, a situation or incident where these type of issues have been tackled there, discussed
Interviewee	I don't know if we had any personal issues that I would say that need to be addressed right now, I mean I said that there are potentially one or two but nothing that I don't think is been more forward from ...
Interviewer	can you describe your most frustrating incident, for the contact week?
Interviewee	Okay for me what was very frustrating was the Monday and Tuesday when we didn't seem to be moving, seem to have gotten stuck in what we were doing, , I think a lot of it was about our own doing, about group dynamic, the group, I feel that , we tend to get caught up in, in debating or arguing about specific issues , I think I said earlier as well that, it wasn't just one or two people, it was different people round the table, there was a,

	I felt very frustrated, I felt we weren't moving forward I felt as though we moving very slowly, that we were losing some stuff that we weren't achieving what we were trying to achieve and we'd get caught up in issues and we just argue around it and argue around it and just felt like we couldn't move forward, that we'd get stuck in stuff, and, that is really where my frustration was for the, for the most of, for the week, and then of course the tiredness yesterday afternoon, (laughing), I just felt like, I wish I could engage, there's so much I want to say, but I don't have the energy (laughing), and that is , I guess that's my two frustrating points for the week.
Interviewer	Okay, in groups, you know that that you got people of all levels of experiences and on this particular group it seems that you, you've got more work experience than your group as a whole, how do you see that affecting your contribution or your group dynamics?
Interviewee	I think that for me was a difficult point, right at the beginning or right at the beginning of this week from Monday not, not the weekend, Monday, I felt as though I had some rank as far as work experience is concerned, as far as, because I've worked longer than everyone else in the group, and I felt almost just though, I was then given that rank, because of that and I felt it, I could feel it, and then I tried not, I didn't, I think that if you take that, I think about [Lecturer C], she says you have to own the rank, so I mean I know that, (laughing), that in a sense, for me the frustration that was, I didn't want that to be an inhibiting fact, that to stop us from learning what we need to learn, and also , for me the fact that you've worked longer doesn't mean that you know more or you know better, okay you have more experience but that, that's one kind of learning it's not everything, and I don't want that to stop not only my own learning but the whole group learning, I don't want to end up being the person or thinking that because I've got that rank, that I can say what I like, and, and then cause then I know I inhibit my own learning, and also I think then I inhibit, but also by holding back, I think that my inhibit the learning as well, the group learning, so, I know there's a difficulty, and it is something that did cross my mind at the beginning of the week, and I kind of thought, I'm not sure how I can deal with it, but Monday, Tuesday that was all, that was quite eminent in my thinking or my feeling at that point, but it seemed to have eased off as the week went by, I think the groups tended to, maybe it's cause as the group grew, I felt okay, maybe it's going to be such an issue, okay, but I did feel it right at the beginning.
Interviewer	now that you, we're at the end of the week again, what role do you see yourself, , you know functioning or carrying in this group
Interviewee	As far as role and co-ordinating, I see myself as being co-ordinating the work, sort of doing collation of the group work, , not doing the work myself (laughing) everyone doing their bit but being able to organise the group, getting the work together , producing the end document but everyone needs to check and proof that, do their bit, I think that, I did that with our (inaudible) group and it worked very well, I know it's different people so, maybe different dynamics I think I can do that, I think I'm good at putting together documents and things , otherwise I'm not sure what else in terms of roles that you (laughing) that you referring to, because there could be a whole lot of roles, you know, I see you as being the challenger, I like that (laughing) but, but that's not, ja, ja...
Interviewer	When are you finished the, the part of systems thinking with [lecturer A], , you know, he requested a, a, two thousand word essay to be you know to be submitted by eight o'clock the next day, how did you feel with that, type of request that put you under so much pressure, ...

Interviewee	I think when you doing an individual assignment like that, and somebody gives you the task, it's easy because you can go and think and plan and whatever, I actually think it's a group cause you were saying, oh there's four of you, divide it between four of you, it's actually more difficult because you all have different ways of thinking, and you all have different styles, so even if you put together the same content, each person, even if you have exactly the same data, the four of us, if we went away for individual assignments we would have totally different look in the field documents, okay, as a group , even as a group one person needs to put the stuff together because you need one field, okay, so you need to have one, one looking field, but it doesn't mean each person can't do the different bits, but then one person has to read through it and put it in their style, I think that, that's the difference with the group, I also think with the group you need to discuss and agree content, which we didn't have a lot of time to do, we also had , there were gaps in our data collection that we didn't, we weren't sure that we agreed with, and I think we were sort of struggling with the process, we didn't actually come to terms with going back to what we were doing, I think that's where your question came is where you bank stuff, you know there's always the problem of never coming back, possibility of never coming back, never re-addressing and, there is that chance and sometimes that's a lost opportunity, I mean I do agree with you that you need to come back to some things, you can't just let everything be banked and let it disappear, but you need to find, as a group we need to find a way to manage that, what we're going to come back to, what we're not, what's really important enough to come back to, and I think, your original question is, how did I feel about the short term assignment, I'm not so anti the short term assignment, doing something like that, I just think that we didn't do it the way we should've, we didn't manage ourselves well, mainly because we had lectures the Thursday night three of us, okay, if we didn't the four of us could've worked but then we wouldn't have put a time limit on it, which is also not right, you know, so, but I think it worked well, in the end (laughing) I mean, you know, it kind of got us into gear, saying I need to pick up speed and do something, , I'm not sure how the rest of the team felt but I think it's, it didn't work the best it should, but I think it did give us , some kind of incentive to get it done…
Interviewer	That's great , we're at the end of tape so, think we can end here.
Interviewee	The second time round (laughing) thank you very much
Interviewer	No problem, thank you very much. END OF TAPE FOUR

B3.2 Sample Interview Cohort 3: Post contact lecture week

Interview 2:

DS400209 11 October **Repertory Grid Interview**	
Interviewer: Part of what you've had to do these past few weeks is to do and complete and hand in a number of course assignments, including position papers, small wins and reflective paper and then the weekly reflections. Which of those assignments do you think contributed most to your learning?	1
For me, easily it was the weekly reflections, they were the most irritating but they were by far the most effective because it forced you to actually reflect on what you were doing on a regular basis. It is so easy, I've done hundreds of courses over the years at varsity or wherever and it is so easy to be amazed in the course and think, I'm learning all these new things and then you never actually apply it, you never actually make it a part of your process and it disappears rapidly. And you kind of look back at something that you did years before, when you are going through your - clearing out your desk one day, and you think, "I wrote this" or "this was quite a amazing - why did I never apply it?"	2
And I think the one thing that ensures that you do use all of the learnings on a regular basis is the weekly reflection. I have to say that it is irritating and it takes quite a bit of time to sit there and you think back over the week, you think what happened, you know or even during the week you say, "What is this all leading to in this week?" because you kind of compartmentalize your working month or your working period and you sort of make the learning's a part of it, it's very effective. I didn't really enjoy it a lot of the time but I have to say that more than anything else it was the most powerful tool that we had.	3
INTERVIEWER: What do you think you learned from it?	4
From the weekly reflection? Or from the course?	5
INTERVIEWER: From the weekly reflection.	**6**
Well I think that I learned that you have to reflect. I mean it is pointless – you can accumulate all of the knowledge in the world, all of the data, but if you don't actually, if you are not actually mindful, if you are not conscious of that knowledge, and you don't apply it, then it is actually a bit of a waste.	7
INTERVIEWER: And did you use any strategies to try and maximize the benefits that you got from them?	**8**
From the weekly reflections? …	9
Pause. I was fairly … conscious of it, throughout the week it was not something that I left to the last moment. A lot of weekly reflections I ended up handing in on a Thursday because I'd had so much happening to me in the week. I wanted to stop that and put it down. And I suppose I could have, what I should have probably done was keep a diary on a daily basis. Now that I think about it. But it wasn't really necessary because I think at the time I was steeped enough in the knowledge, steeped enough in the course. Everything was quite current. I think being conscious and mindful helped. Makes sense?	10
INTERVIEWER: Well we can come back to it.	**11**
INTERVIEWER: Which do you think of these assignments contributed least to your learning?	**12**
Umm. From a contextual point of view I would have to say that it was the position paper. That is not in and of its nature – if it is not in and of the position paper that that was the case. I think it was for me a situation where I didn't actually have the time that I needed. I felt harried and harassed. I wasn't satisfied with the outcome basically. I felt like I needed another week. I think a lot of it was just a negative feeling about it. Maybe it was not necessarily - it did contribute significantly to my understanding of the course because you needed to go back and refresh and you needed to apply in depth what you learnt. So without the position paper, I think, my level of understanding	13

wouldn't have been as good as it was but the thing is in doing the position paper I got that level of understanding and then I just never had the chance to perfect it. So I think that was more of a frustration thing.	
INTERVIEWER: What do you mean by that, you never had a chance to perfect it?	**14**
It was more of a case of having done the research, and having compiled the -having gathered the data I just didn't have the time to organize it the way I wanted to. But I mean it is all semantics – the position paper was a useful thing. I would have to say I think we should have done it differently. I think I got a bit blind-sighted by the SCQARE thing. What would have been nice is if we could have had lectures going through each one of the SCQARE components. We could actually have built up the position paper week by week. And that would have expedited matters somewhat, I think.	15
INTERVIEWER: Which of the activities of the contact week, do you think, contributed most to your learning?	**16**
Now you asking me. The contact week?	17
Activities?	18
INTERVIEWER: Would you like a reminder?	**19**
No, no! I'm just doing my recollection. Umm.	20
Contributed the most in terms of providing a … good reference. I would definitely say was that final paper that we did, the position paper that we did within the course in the last couple of days - that was really useful. I didn't see it at the time. I must say I felt quite lost. Didn't understand a lot of what we were doing at the time but once I actually started doing my own reading and applying some of the knowledge, going back to that was extremely useful.	21
INTERVIEWER: What do you think you learnt then?	**22**
I think the important thing there was everybody else's perspectives on what we had learnt. Because it is so easy to have your own idea of what somebody is talking about and you know, the person sitting next to you can have a directly different opinion and sometimes you are completely wrong when you see what they come up with you just quietly shelve your own understanding and think OK it's a good thing I heard that one.	23
Just being there with people in my group and actually seeing their perspectives on all of the learnings and hearing what they had to say was quite brilliant – that was really nice.	24
You know, I actually felt quite stupid at that point because I think everybody else was catching on a little faster than me at that stage. I think I had gotten a bit lost and just being able to consolidate that information with them was really useful.	25
INTERVIEWER: We were last talking about the activities and the contact that had contributed to the learning and you were talking about the group position paper that you did and you mentioned the perspectives of the other people that part that contributed to your learning.	**29**
Would you be able to use that? Do you think - how do you think that came about? Is it because of any initiative on your part? Or because of structure that was imposed upon you?	**30**
I would like to say it was because of initiative on my part but it definitely wasn't.	31
I think that it was definitely a structure that was imposed on the group by I think, Student A and Student B – I think they had something of a head start in some of the stuff that we did. Unless they did another course that had summed it up in it but they just pretty much knew what to do, so they kind of got everything moving – it was quite helpful.	32
For my part it was simply a question of following their guidance.	33

That is important too in my defence. You are not always going to know where the road is leading, you are going to have to let somebody else lead if they have better insight into a particular problem and in that situation they have the better insight. I think Student A provided us with good direction and building on that we all, I think we all did contribute.	34
INTERVIEWER: What contribution do you think you made?	**35**
Pause. From what perspective? Literally – what did I contribute? Or socially and interactively, what did I contribute?	36
INTERVIEWER: You said that Student A and Student B took the lead. I'm not looking at what you contributed in terms of actual detail of what you did but in terms of you wanting to maximize what you got out of it.	**37**
For me it was a situation where I was trying to assimilate a lot of the knowledge because – I did feel that we were going a bit fast at that point, and I did feel that I was a little bit left behind. So I think it was just being a sponge, picking up as much information as I could. And when we were getting stuck providing a sounding board and throwing the odd suggestion over here and asking questions to see where we were going, what we were doing. That is what I took from that particular process. I wasn't driving that process, definitely not, but that's not to say that I didn't gain a lot from it. I found it very difficult though – I found that particular process very difficult. But in retrospect I did gain probably more from that than from anything else. I mean everything else contributed to that point and sort of headed toward that point.	38
INTERVIEWER: Which of the activities contributed least to your learning do you think?	**39**
Least? Definitely watching Lorenzo's Oil, I've seen it before so I can't …really say. I'm, not sure what the point of that was to be quite honest. Good movie… I suppose I see what the point is but I'm not sure... I don't think it really made an impact on me. I mean that's just me personally.	40
INTERVIEWER: So do you think in order for you to learn something things need to have an impact upon you?	**41**
Pause. No, no not necessarily but I think that the lesson that movie was trying to teach was one that I was familiar with already. The overriding theme of the movie which is challenging of conventional authority.	42
INTERVIEWER: Is it something you do?	**43**
I make a point of never assuming that anybody knows everything. Definitely. So it is something that I am very aware of. I mean I have seen enough doctors who have been arguing with each other exactly what is wrong with me this past week to know that doctors really are in as much of a nebulous space as us; there are no certainties in medicine and I don't think there are many certainties in life either, so, to assume that one person or one group of people can be 100% correct is a mistake a lot of people make. But no definitely try not to.	44
INTERVIEWER: OK. Which of the course activities do you think you enjoyed most?	**45**
Enjoyed most, I think was definitely doing the rich picture. I like the whole [Lecturer C] lecture section…and working on visualization is a very rewarding process. There is something tangible that comes out at the end. I don't know I think that is just the way my head works. I like to take abstract concepts and turn them into something meaningful and tangible.	46
INTERVIEWER: What was it about the way [lecturer C] did his work that really appealed to you?	**47**
Pause. Um. I think the way that he organized it. I've been using mind mapping since high school and that kind of thing does have an effect on how you organize your thoughts, so the way he organizes his thoughts was actually quite similar. So I felt I did have insight into a lot of what he was saying. His manner of imparting the ideas, in almost a sort of micro-modular fashion. I think I've got a headache.	48
INTERVIEWER: I can see you are not feeling well.	**49**
It's fine	**50**
INTERVIEWER: It's fine… if you are happy for us to continue?	51

INTERVIEWER: You speak about [lecturer C] doing visualization, using concept maps and organizing his work in a micro-module. You said it was similar to the way you would do things in terms of the visualization.	**52**
Not similar. Similar to the way I have done things, certain things, but … pause.	54
The only way I can really explain it is that in high school I would take my work and reduce it to mind maps and I would completely change the structure of the work and that worked very well for me. Then coming to university I stopped using them and I started using sort of the methods that were used by the professors in the various courses and it didn't really work for me. And you kind of get caught in using other peoples' structure. And then you know, here and there I'd switch back to mind maps and so forth. I think in my general working life I tend to use the structures for data for knowledge that are set up conventionally but what I say is that I still have a kinship for the mind map model. It's just that it takes a lot of effort and a lot of energy to take something that is organized conventionally and reorganize it according to mind map. And, for someone who is intrinsically lazy, it just doesn't happen a lot of the time. So I relate a lot to what Lecturer A was doing and it makes a lot of sense to me but do I do it myself all of the time, emphatically no. I should, and I would like to, but, the irony is that if you do it takes you a lot of time to build that first map but once it is built you can glance at it and ten seconds later you remember everything. Whereas if you use conventional knowledge and data structuring, all you've got is reams and reams of paper and reports and they mean nothing. You can look at it and it will take you three or four hours to go through it each time. So that's pretty much what I took away from that.	55
INTERVIEWER: Do you think that having something to look at like that, once you've converted it into a mind map, do you think that the process is something that allows you to learn about whatever it is that you are mind mapping?	**56**
In order to create a map or any visual representation like a rich picture you have to understand the work completely. Arriving at the map does help you to understand the work. As you construct it you see the systems at work and it sort of all falls into place. You might have to scrap a couple as you realize that you made mistakes somewhere else, but once you've got the final map you understand that work. There is no doubt about that. That is why it takes two three times longer than just organizing it in a report or some other structure like that. So it's…as you go, as you build it and also before you build it you have to understand quite well before you build it and as you build it to come to understand it completely.	57
INTERVIEWER: Which course activity during the contact week did you find the most difficult or challenging?	**58**
Definitely the composition of the position paper.	59
INTERVIEWER: The group position paper?	**60**
The group position paper…I think it was just a question of in that situation I was a little bit off the base and so trying to keep up with the speed that the process was being driven at. I think you remember we finished long, long, long before the B group and as much as I appreciate that [student A] and [student B] were driving the process and they seemed to know what they were doing but at the same time if I'm going to be honest, in retrospect I think they were driving it a little bit too fast for me. So I found it difficult. I learnt a lot from them and I learned quite a bit in doing it but I think being accustomed to being a more active member and being able to contribute to things like that. Being in a situation where I was learning and listening and taking rather than contributing as much as I would have like to have was …it was a bit difficult. Nobody likes to feel like the slow kid in the group and I think, it is just one of those things you are used to being in a driving role when you are forced to sit in the back seat it is a little bit, I wouldn't say humiliating, but humbling I think. In that sense it was good but it was still difficult.	61
INTERVIEWER: Which do you think you learn more from, in my previous interview you said a lot of what you learned in work environment was through trial and error, you had to drive processes and then learn as they succeeded or failed. So which do you learn the most from, which learning environment would you prefer – when you are driving and learn as you succeed or fail or if you are learning from someone else?	**62**
Let me see. Look there is …there is no question about it really. Driving is great but the avoidable accidents; they are just not worth it. You look back and I suppose you wouldn't change anything and those lessons that you learned, that you do learn, if you take them in, if you understand what happened and why, you will never forget. I found them very, very powerful lessons but at the same time they can be lessons you wish you had never had to learn. So learning in that process is not as powerful, not as immediate, the lesson isn't as	63

unequivocal to you. You don't have any personal proof that it works this way and not another way, you're just taking somebody's point of view or somebody's own experience…on some level you are going to question it, much like the guy in Lorenzo's Oil questioned it, because you have no actual empirical evidence that it has to be this way but if you trust the source of the information enough and you feel that it does work and you can see the positive side of it without needing to see the negative repercussions of not doing it, then I think it is probably the most useful way to learn. I'd even that and say that you have to make your own mistakes in life, you have to see what the mistakes are, what the repercussions are of making mistakes. Somebody who has never made mistakes in business just, I wouldn't want to work with that person because they have had no real… understanding of risk, no real understanding of mistakes, you have to make those mistakes. You need to do both but once you've established the costs of learning by experience I think you are more inclined to head for the other type of learning.	
INTERVIEWER: Which was what, what would you call it?	**64**
Which is …learning from other peoples' experience basically. As long as there is enough …evidence to go along with it, enough empirical data to back up the stuff, then, why not.	65
INTERVIEWER: So you need to trust the source then?	**66**
You definitely need to trust the source. There has to be data to back up that source, I don't have a problem with it but I still say learning by doing should at least make up 20% of your learning. It is important to make those mistakes.	67
INTERVIEWER: How did you go about doing your position paper?	**68**
Pause. Let me think now…it was a little bit different to the way I normally compile a paper because you have to organize the structure for the entire paper in the SCQARE, which is not something I normally have, it was a little bit of a crutch to fall back on. I pretty much worked through it according to the SCQARE. I had the small wins that I was doing at the same time…and that really formed the basis of the paper. Let me think back … few of us had this project report that we also had to do and I think they kind of left that a bit late so I worked on that until about the end of July and then I threw myself into the position paper…how did I go about it? Pretty much according to the square. Just worked through it piece by piece. Normally what I'll do is … I'll do my research, that usually takes a few weeks, I'm talking about when I was doing my honours now, I'd do my research in two weeks or so and from there I'll build up a framework, just a rough framework, and in that framework I'll fill in the data, and do my referencing, from that I'll do the first draft, usually a second draft and then I'll hand in my third and fourth draft. But from the first draft to the second draft it will normally take me three, four, five days to a week to write. The first draft and second draft are usually wildly different because I tend to reorganize my data quite significantly and build up my own logic because for the first draft what I'll do is I'll write out the stuff as it occurs to me, as it comes to me from the research. And then on the second draft what I'll do is I look at the logic and say does this flow? And then I'll leave it. I like to leave it for a week or so and then just banish it out of my mind. Then come back to the third draft which is usually the final one. I read through it, try to read through it as if I was coming to it fresh without any preconceived notions and if it makes sense to me then I am happy. I usually make a few changes here or there and then I normally, by then I'm normally well sick of it and that's about what I like to do. In this case, I mean that is my usual way of going about it, in this case I unfortunately didn't have the time to do it. What you have essentially is my first draft, I'm sad to say!	69
INTERVIEWER: OK. Just one more element and that is, is there any other component of the contact week that you would describe as significant learning for you?	**70**
Pause. Significant learning from a technical, theoretical, social …?	71
INTERVIEWER: Either in terms of what you learned or how you learned?	**72**
Pause. I'm just trying to think of something that leapt out at me…umm	73
INTERVIEWER: Well it could then be in the process of you assignments too, the process of completing your assignments.	**74**
OK fair enough. I must say the small wins was a bit of a revelation. I was extremely leery of the small wins. I didn't think that it was a useful method at all. And ironically I think that for me was probably the biggest surprise, was that in doing small wins and going through the literature on small wins, I found I actually experienced a complete reversal of the thing. I think small wins is brilliant now, I think it is	75

the only way to do anything to be quite honest. And that was quite funny for me actually, especially when I thought back on my first thought when we were introduced to small wins, this is rubbish this will never work. It is just brilliant the way…when I use that method at work. And when I actually sat down and thought about how we go about changing things at work and how it really doesn't work at all…it has got to be the only way to do things. So mean I was glad that I was forced to actually do the small wins because I got a lot out of that and if I hadn't been forced to do it I would have, I would just never have bothered because on the surface it seemed ridiculous. It goes against all the, the stuff that I'd been taught over years and years and years. In doing a commerce degree everybody blabs on about the strategy this strategy that. Business people sit in strategy meetings for days on end and that's all they do, is strategy meetings. Fifty guys in strategy meetings, two guys outside digging a trench…and I think just getting out of that whole mind set was, was brilliant for me. In my company we've had strategy meetings till the cows come home, maybe we needed to change the way things were done were being done, that's why we fell back on the crutch of doing the strategy meetings, and saying, "What can we do?" We need to look at everything, so we can understand what the business is and how and where the business is going and after doing that we'll know what to fix. And that just never worked. And those things… Those things would be significant learning.	
INTERVIEWER: Good. Well we'll go back to our Rep Grid again. Do you remember it?	**76**
Vaguely.	77
INTERVIEWER: Taking three, selecting two that are similar and different from the third, based on either what you learned, or how you learned. OK.	**78**
Pause. OK let me see now, I take three and relate two…	79
INTERVIEWER: Two similar and different from the third.	**80**
Let me just take these first three. Let's see. Pause… I'll put these three to begin with… because I think with those two I was… building on my own experience and I think I'd done a lot more personal research and I was a little more comfortable with the … concept… Am I doing this right? I'm just trying to remember how…	81
INTERVIEWER: Yes that's fine, so in terms of how you learnt to just building on your…	**82**
This was practical, this was building on what I was actually doing in my work. You know, things that made no sense to me in the group position paper, because they had no context for me, were now made clear to me. I think that is another part of the group position paper that made it difficult for me was that I had no context. And I think in systems thinking you have to have context if it is going to make sense to you. For example the concept diagram which I struggled mightily within that contact week, and became absolutely second nature to me the moment I stepped foot in my office again. I don't think it was necessarily because in the contact week I was being introduced to it and it was new, I think in the contact week, sure I was being introduced, so it was new but the variables that we were talking about meant nothing to me and the relationships between those variables were invisible to me. The context diagram is about the relationships more than the variables itself. You are sitting in work those work relationships jump off the page at you, they are screaming at you, look at me. That I think made a big difference in that process. Which is not to say that the group position paper wasn't useful, it was very useful. It's just that it was a bit of a hard slog compared to the insight that came later. You can't really get insight at that early stage I don't think unless you are a remarkable individual. Insight definitely comes with your own reflection, with your own context.	83
INTERVIEWER: So insight didn't exist here at all? Or there was insight here?	**84**
Insight came here definitely.	85
INTERVIEWER: And with that one?	**86**
This one was … pause was I suppose preparation for the insight, giving you the tools to be able to experience the insight.	87
INTERVIEWER: OK. Pause. Could you take another combination?	**88**
Pause… These three are completely unrelated. Watching Lorenzo's Oil, doing the rich picture and my research paper … no, these are	89

completely unrelated.	
INTERVIEWER: OK. Take one of those out and combine these with it.	**90**
Pause. OK.	91
INTERVIEWER: Is that the combination?	**92**
Ja. E5, E1 and E4. Pause.	93
One of the early things I did when I got back to the office was actually do a rich picture… with the guys in a meeting. And it amazed me how you can actually draw exactly what a company does with a couple of squiggly pictures. It's crazy actually. It was even simpler than the one that I ended up handing in, in my position paper and I left it on the white board there and I stared at it day, by day, by day and the irony is that we have had a dozen strategy meetings over the years, where we have tried to thrash out exactly what it is that we do and there it was written down in 10 or 11 minutes and it so completely summarized exactly to a tee who and what we are and that was just amazing actually. It was one of those moments where you realize actually the power of visualization, the power of using systems to model what you are doing. It was really nice actually.	94
The weekly reflections, they definitely, would I say they contributed, to that particular concept of rich pictures? I definitely would. Because it forced you to keep the knowledge current. I have to say I did do the rich picture quite early on, I don't think I had done a weekly reflection at that point yet. But coming back to it later for the position paper I did go back and recall my reflections and use them as a body of experience to build on. Pause.	95
I suppose…perhaps not the rich picture per se but I mean causal loop diagrams for example were something that I got more and more comfortable working with over the weeks and that was definitely because of the weekly reflections. I think I mentioned in one of our lectures that there was an issue that had been bothering us for quite a while and we just solved it because I said "What are the variables?" I jotted them down and …I looked at them and I said to one of my co-workers, "What do you think? Look at this? What do you think is the problem?" and he looked at it and he went to sit down and a minute later he looked up at me and said, "This is the answer."	96
It was the answer and something that had bothered us for ages, and ages and ages. Can't remember what it was now…	97
INTERVIEWER: What did you learn?	**98**
I learned from that, that I work with very clever people, but you actually forget how clever they are because people generally have no tools to exercise their intellect. If you give them the tools to exercise their intellect they will. You don't have to actually solve problems for anybody else, you just have to give them the tools to solve the problems themselves.	99
INTERVIEWER: Now would you call those tools that exercise their intellect?	**100**
Definitely.	101
INTERVIEWER: And this in contrast?	**102**
The difference is this is… passive. Watching a film can be an active thing if you make it but more often than not it's going to be you sitting there in front of the television, watching, feeling on your own, shutting down and that type of passive learning, you do learn but you never learn as much as when you actually pick up the shovel in your own hand and start digging. You can watch somebody digging and sure you learn about digging but if you actually do the digging, it's a big difference. If I think back to the day I taught [name of colleague], fund manager ended up working with [name of well known employer] . At one stage before he started working as a fund manager he was the top guy in the country in mining funds, managing mining funds, gold funds and mining companies and stuff like that. And there was a simple reason for that, from the age of 16 to the age of 30 he worked in a gold mine, down in the tunnels because his father had died and he was forced to support his family. Work in the gold mine, put his siblings through university. At 30 he left and went to study himself because they were all done and he became a fund manager and nobody could touch him because he'd actually dug the gold out of the ground himself. And I think when it comes right down to doing the stuff it is just more effective.	103

INTERVIEWER: So this is about doing stuff, this is about tools for exercising your intellect. Now to use that language to contrast this…	**104**
That is passive learning. Pause.	105
INTERVIEWER: Would you use a word like observation as well?	**106**
I wouldn't use observation because there's an element of activeness in observation. If you are observing you are observing something as it's happening, actual, you have a situation where you can comment maybe or ask questions. I think in watching Lorenzo's Oil it is merely historical, so …	107
INTERVIEWER: You would call it passive learning?	**108**
Completely passive, yes.	109
INTERVIEWER: Take another combination?	**110**
OK. We did the research paper, let's do the three papers.	111
Research, position paper and group position paper.	112
I think these two definitely go together, that's E2 and 6 and E3 separate.	113
E2 and E6, solo efforts… building on my own insight definitely… whereas E3 was more a question of multiple perspectives and learning from one's colleagues…	114
INTERVIEWER: OK. Another combination?	**115**
Pause. Small wins, rich picture and weekly reflections…pause.	116
INTERVIEWER: Choose two similar and different from the third in terms of what you've learned or how you've learned.	**117**
E7 and E1 together. E5 separate. Pause.	118
E7 and E1 I'd say were things that I appreciated, small wins and weekly reflections, I appreciated the learning once I'd experienced it. It's something I needed to be taught, if you know what I'm saying?	119
INTERVIEWER: Ja	**120**
Whereas the rich picture is something that leapt right off the page at me, made immediate sense to me.	121
INTERVIEWER: What did you need to be taught?	**122**
I needed to be taught the techniques, I needed to be taught why it made sense and in a way I needed to be taken to the water and made to drink, if you know what I'm saying…it wasn't intuitive…I mean not all that is intuitive initially but once you've gone through the process it can make sense to you and can be 100% meaningful to you. It is like explaining to a kid why he has to eat vegetables, you are not going to be able to do it until you can give it to him or her in a context that they understand and can come to terms with.	123
INTERVIEWER: If that wasn't intuitive in contrast is that intuitive?	**124**
Ja, definitely. That just made sense to me immediately.	125
INTERVIEWER: OK. Another combination?	**126**
Pause…Let me see … pause …	127

If we do small wins, the position paper and … E7, E2 and E3.	128
Well small wins and the position paper definitely went together…at that stage I, when we were doing the group position paper I still had no real love for the theory of small wins…pause…I think the group position paper talks about the concepts that we learned and put them down but in the end it was small wins that actually gave me the mechanism to implement those learnings in the work place…so my position paper was pretty much based on that…pause…I don't know, I'm not getting any connection over here – what are you thinking?	129
INTERVIEWER: Is there something that these two have in common? Maybe in the way you prefer to learn? Or maybe in terms of advancing your learning?	**130**
Let me see, both, all three of them were instrumental in advancing my learning.	131
INTERVIEWER: But how are these two different? You seem to be making a case for them being different.	**132**
Well they were different in time…	133
INTERVIEWER: Mmm	**134**
They were different in context…	135
INTERVIEWER: From that one?	**136**
Mmm	137
INTERVIEWER: Mmm	**138**
INTERVIEWER: So was context an important way of differentiating them?	**139**
Mmm, I'd say so. These were applied directly to my own environment, that one wasn't.	140
INTERVIEWER: Which do you prefer?	**141**
It's not a matter of preference really, it's a matter of, ok it is a matter of preference. I do prefer contextual but that's not to say I don't understand the necessity of the pure theoretical…the one can't exist without the other. But still obviously the contextual is easier, so there is a natural preference, a natural leaning towards it. I wouldn't seek to divorce the two.	142
INTERVIEWER: What were you learning in these now? Were you learning how to use the tools or were you learning how to be more effective in your context? Or were you learning about your context?	**143**
I would say the tools finally made complete sense to me…pause.	144
INTERVIEWER: Now if this one was about learning how to use the tools by applying them in the context, what was that one about?	**145**
Learning the theory behind the tools really. Theoretical basis for the tools…pause.	146
INTERVIEWER: Is there any other combination that you would like to try. That would tell something different about your learning?	**147**
Pause. Long pause. Let's see…long pause…How many have we done?	148
INTERVIEWER: We've got six.	**149**
I reckon that will do!	150
END	

B4: Sample Observation Notes:

Cohort 3 Module 1 23 June (Left hand, right hand column notes)

Class activities	**Observations**
Lecturer B Presented a session on Collaboration in Projects (This session was to be followed by a group application of the tools and concepts). Dealing with a notation for pondering and representing a collaborative design. Lecturer B introduced topic by telling the story of his experience with (NAME) a project. Noted that at the beginning of a project establish a language. Structuring a way for people to think. Design of collaborations for management. Facilitated conversations. Commitments in projects Introduced concept of commitment plans. Introduced Affinity Diagram, Interrelationship Diagraph and Causal loop Diagrams. Shift of focus from managing outcomes to managing drivers.	People appear alert and responsive. Comments of agreement or nodding heads, e.g. student 1, 2 and 4. Students 1 and 4 seem to share common myths in the IT industry e.g. "users don't know what they need." Student 2 related to the case study by saying that that was exactly what was happening in his work environment. Students eyelines' moved between facilitator and slides or artefacts that he was using. Student 2 and student 7 responded by asking questions. Some students were making notes. Student 2 said that he had been doing these things since he had started managing "I implemented this without knowing I did. I empower my guys to do things on their own". Student 3 said "in my experience you end up needing to be an expert in every area you are managing". Other students made notes when another section introduced.

B5: Sample field notes

Cohort 3 Module 2 20 September

These are students' comments at a morning 'check in', when asked to reflect on their learning from the previous day's session:

Student 1: I learnt more in the last module, finding too much group work in this module.

Student 2: Finding group process gives me more opportunity to learn, I can ask [the course convenor] and find out errors in my understanding.

Student 3: Found in our process yesterday the data given in the case study was not the data we needed for systems failure analysis. Realised that we needed to do research, used the internet, to get more information first. We wasted about 4 hours yesterday as we did not understand.

Student 4: We were misguided by the lecturer [Lecturer D] who indicated to us that we needed to write variables and do a CLD but we realised that we needed to do it differently.

Student 5: Similar to [student 3] things became more clear when I read up at home, so we needed to do more research before we started.

Student 6: Found learning better in the first module.

B6: Summary of exit interviews of early leavers

Interviews conducted by researcher and educational psychologist in a venue off campus.

Interviewee	Academic Progress	Reasons for leaving	Value added by programme
Woman, with MSc engineering qualification, left after contact week of module 1.	Progress perceived by convenor to be good.	• Lack of perceived synergy with job • Although had a high degree of interest in the programme, felt that this interest was not sufficient to justify the time commitment • Time commitment included commitment to group and integration into work environment • Had changed to a smaller company while locating to a larger company during initial interest in programme, felt more options available in larger company for synergy with programme	Had no regrets in having had participated, would consider re-registering if personal circumstances changed.
Male, with Hons degree, left after full completion of module 1, submitted all individual assignments.	Progress perceived by convenor to be good.	• Work (corporate) pressure (increased since commencement of course) • Time away from family	Action research and action learning Systems thinking, bringing different discipline together, considered to provide a competitive edge.
Male, without a bachelor's degree, had a postgraduate diploma in Adult Education (after recognition of prior learning process to gain entry). Left after contact week of module 2. Had been asked to resubmit individual assignments for module 1, as initial assignments were inadequate.	Progress perceived by convenor to be inadequate.	• Work pressure (corporate) • Was not able to deliver to appropriate academic standard, therefore something had to give • Had entered the programme as SAQA required a Masters qualification of him in his job.	Had used action learning and systems thinking in his job, these emerged strongly as useful component to take away from the course.
Male, B. Comm, chartered accountant, Left after module 1, had not submitted individual	Progress perceived by convenor to be good in group process	• Had been under the impression that could go into the second year of an MBA after the completion of the first year of this programme (Indicated that the impression was created by his company who was sponsoring him for the	Basics of thinking systemically (in contrast to perception of MBA, where content was thought to be in his comfort zone of

assignments.		programme). Considered the MBA more marketable. • Problem with the course that the time between contact modules was too long, he needed more regular contact.	Marketing, Finance subjects etc). Systems thinking thought as an important aspect of the course as an alternative to silo thinking.

Appendix C: Research Ethics

C1: Ethics Statement for Research Project

Researcher: Corrinne Shaw

Head of Department: *Deleted for reasons of confidentiality.*

Name of Project

Use of the Repertory Grid to elicit constructs of students participating in a postgraduate management development programme.

Purpose of Project

For the collection of data towards a PhD qualification and to provide a framework for personal reflection on your participation in the systems practice course and postgraduate programme.

Statement of Consent

Participants will be informed that all participation is voluntary, all information is strictly confidential, their right to privacy will be respected and they will be asked to indicate consent.

Protection of Identity

The identity of participants will be protected with the use of a coding system which will use details appropriate to the researcher. The names or any other information which contributes to the identity of individuals will not be published.

Withdrawal from Project

All participants have the right to participate or withdraw at any point without any consequence to themselves.

Researcher's Details:

Name: Corrinne Shaw

Email Address: [redacted] *Deleted for reasons of confidentiality.*

Telephone Number: [redacted] *Deleted for reasons of confidentiality.*

C2: Statement of Consent

The purpose of this project is to explore the learning of participants in a postgraduate management development programme. This project contributes to my PhD degree.

You will be invited to a series of interviews. The format and purpose of the interview will be explained before commencing.

If any additional information is required, please do not hesitate to contact me on *deleted for reasons of confidentiality* or *deleted for reasons of confidentiality* via email at *deleted for reasons of confidentiality.* Participation is entirely voluntary. Should you agree to participate, I would appreciate an indication of your consent in the form of your signature in the space provided below. All information will be dealt with in the strictest confidence.

Name:……..

Signature:……

Date: ……

C3: Interview design

This is a 3-tiered process:

Part 1: Identifying elements by answering the questions posed to you.

Part 2: Eliciting constructs

Part 3: Analysis of the data and conclusions.

Part 1: Eliciting Elements

Instructions (Spoken to the interviewee at the time of the interview):

A. You will be asked about Key Events with respect to your learning in a context of the systems practice course. The events, which you list, are called ELEMENTS. Please adhere to the **principles** listed below in selecting your ELEMENTS.

Some underlying the development of a good element set:

Elements can be nouns or noun phrases, or verbs and verb-phrases.

Elements should be as concrete and specific as possible. If you have used an event or situation in 1. above, take care to make them specific and time- bound, to the point where they can be captured on video as separate occurrences.

Elements should be discrete, separate from one another, with no overlap.

The element set should be homogenous: all elements should carry equal weight, be equally representative of the element class and feel as if they all have an equal right to be there.

(Sourced from Stewart,V. and Mayers, J. , 1997: *Enquire Within, The Repertory Grid Interview*).

B. Please complete the table below. Questions and qualifiers (In terms of …..) are provided in the table in order to assist you in compiling this list.

Thank you very much for your assistance.

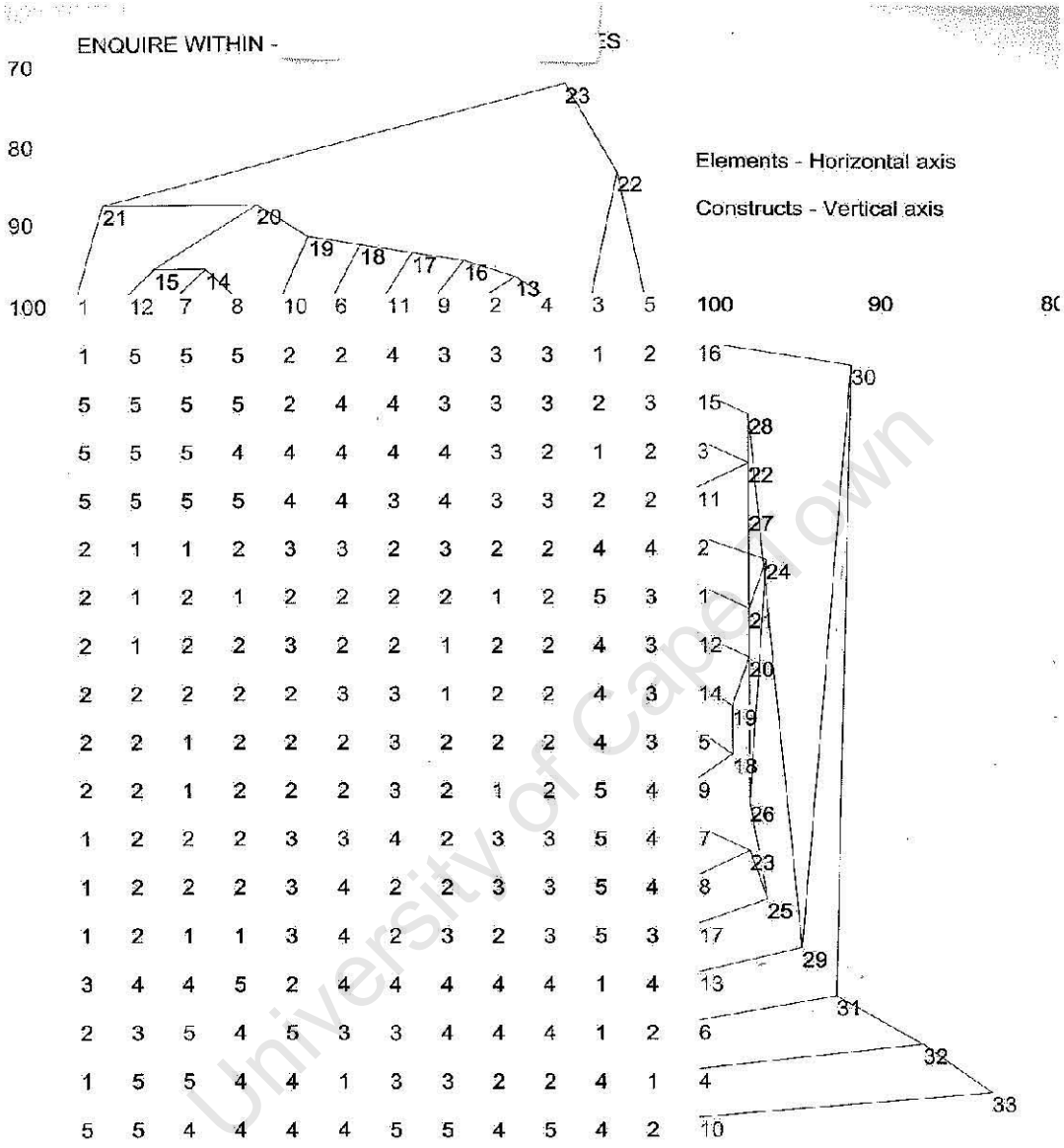
Appendix D: Examples of Analysis

D1: Repertory Grid Analysis

D1.1 Partial Ratings Grid.

	E1	E2	E3	E4	E5	E6	
Skills	1	1	N/A	5	1	4	Gaining understanding
Immediate	2	2	1	2	5	1	Long process
New things, from unknown	**1**	**2**	**N/A**	**2**	**5**	**4**	Gaining better understanding of what is already known

D2: Example of dendritic analysis using EnquireWithin



D3: Clusters: Cohort 1 Examples

A cluster analysis is carried out using the initial results from dendritic analysis with EnquireWithin. Elements and constructs are clustered in families when they are correlated at greater than 90%. This relationship is then discussed briefly and comment made on those outlying elements or clusters.

Student 1, cohort 1

ELEMENTS

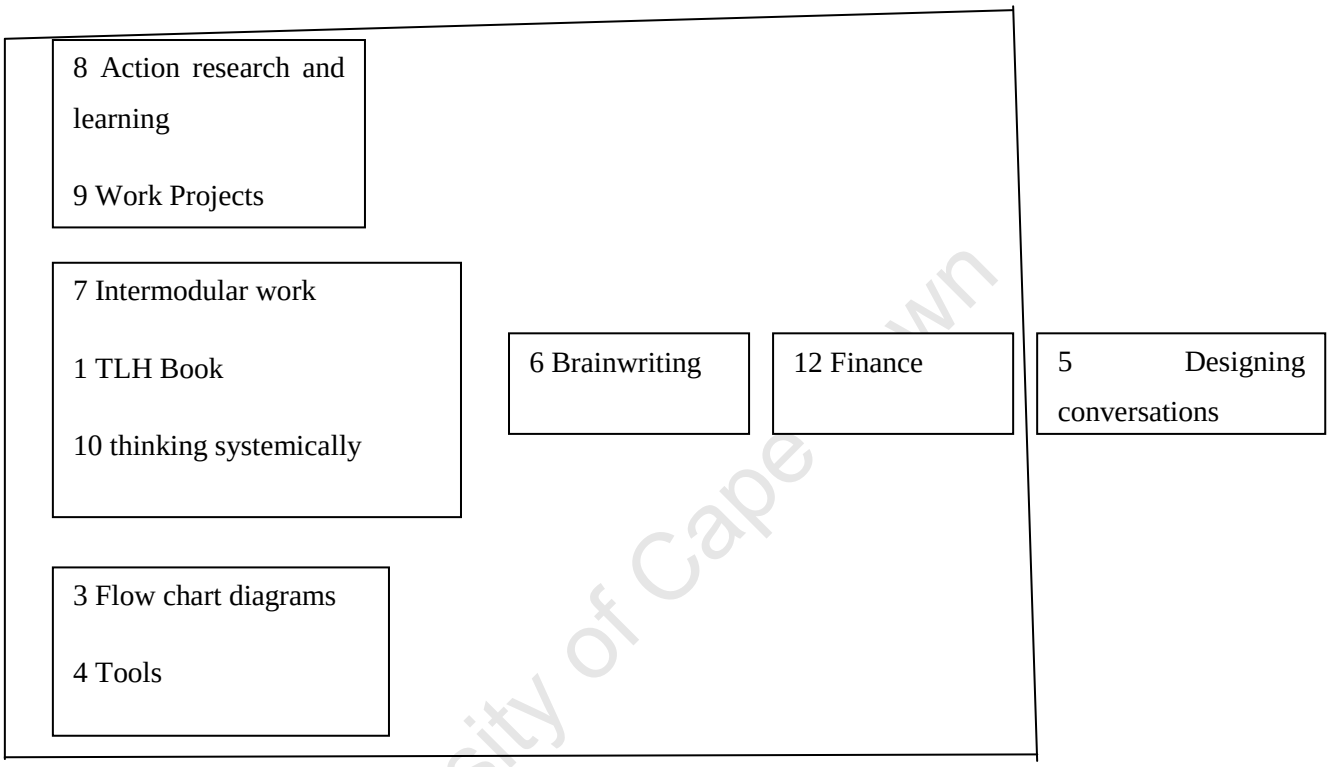


Figure D.1 Correlation of Elements

The majority of the learning events as associated with participation on the programme are highly correlated.

CONSTRUCTS

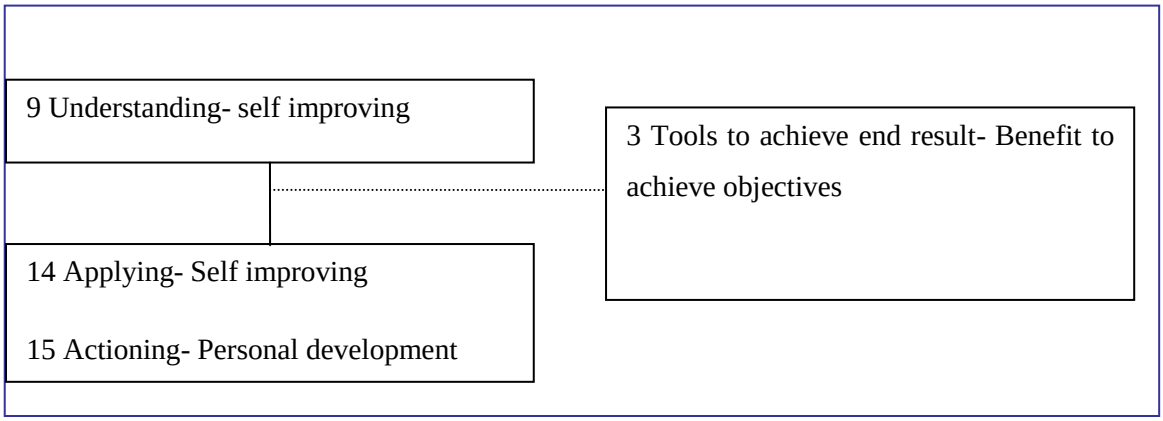


Figure D.2 Correlation of construct cluster 1

This grouping of constructs demonstrates that outcomes are perceived as either achieving an end result or self improvement.

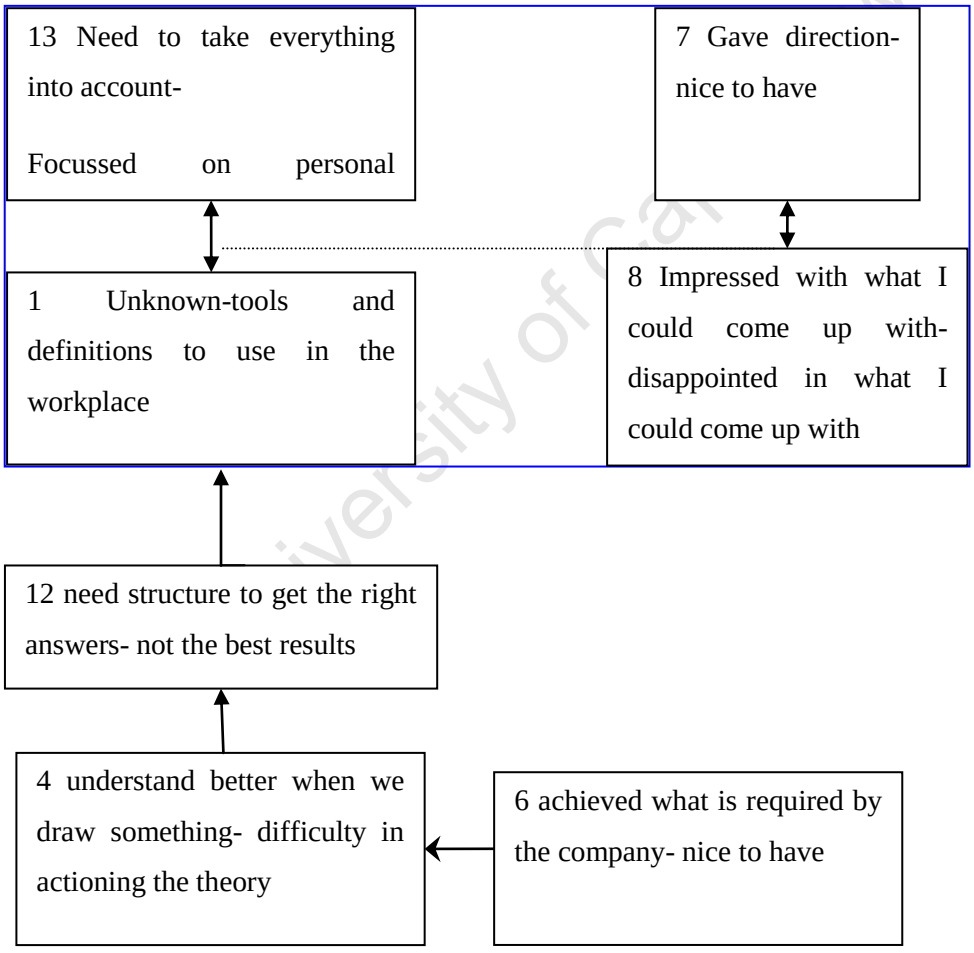


Figure D.3 Correlation of construct cluster 2

The primary correlation between 1 and 13 illustrates a relationship between work and personal objectives. The correlation between 7 and 8, "with direction the consequences were impressive", in conjunction with 1 and 13 seems to indicate a pragmatic approach. This is achieved by the use of structure (12) and illustration. It is important to the candidate to achieve in the work environment.

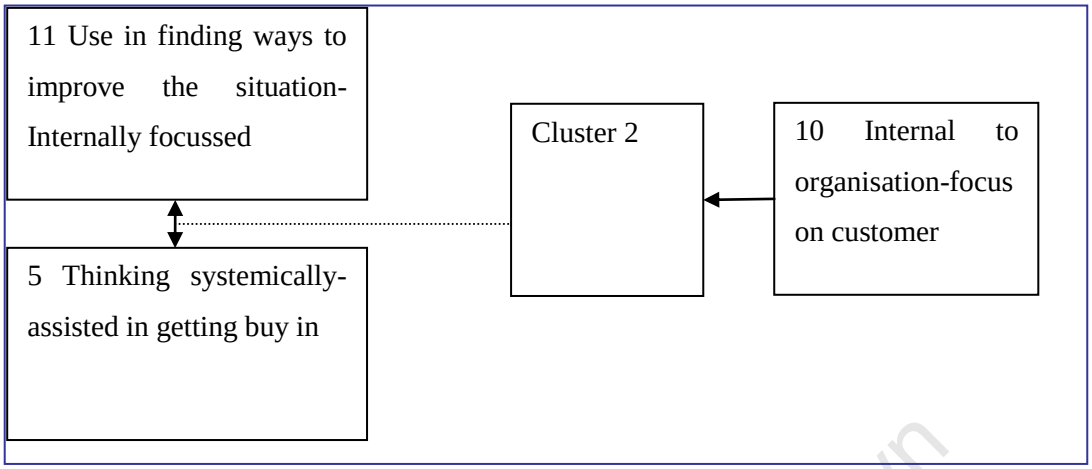


Figure D.4 Correlation of construct cluster 3

Cluster 3 has a primary correlation between 11 and 5 providing a relationship between application and thinking.

The correlation of constructs implies the importance of relevance for improving workplace practices and self/ personal improvement. There is a focus on end results and achieving objectives.

Student 5, cohort 1

ELEMENTS

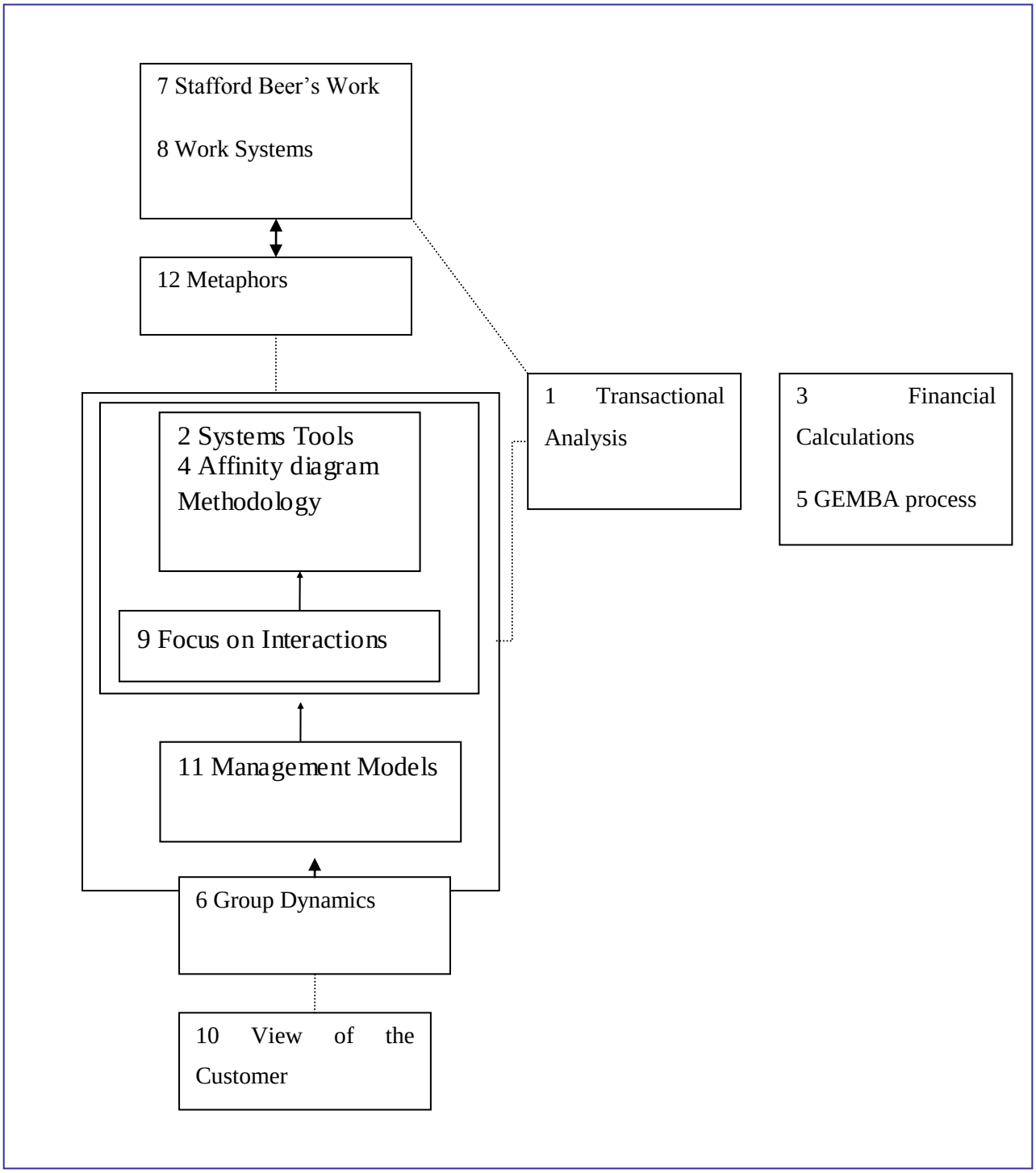


Figure D.5 Student 5, cohort 1 element clusters

Correlations indicate above 95% for elements 7 and 8 with 12 as one family. The second family has 2 and 4 above 95% plus 9, 11, 6 and 10. 3 and 5 are correlated at about 85%. As third cluster 1 is correlated with clusters 1 and 2 at about 87%.

CONSTRUCTS: Student 5, cohort 1

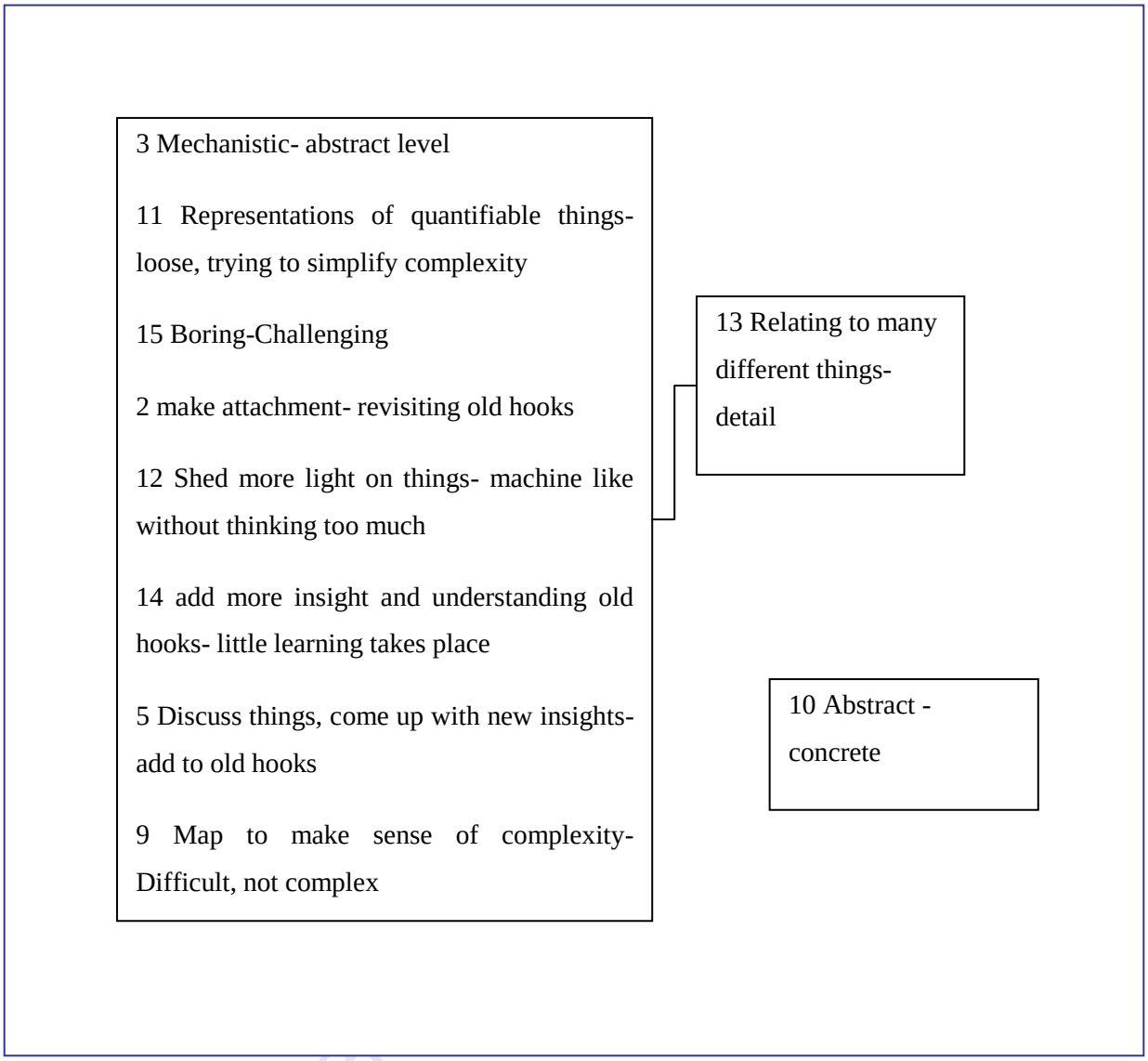


Figure D.6 Correlations of constructs for student 5, cohort 1

It is immediately evident that all constructs highly correlated at >95% with the exception of constructs 6, 4 and 10 and 16. The large, dense cluster of constructs reveals that learning is characterised as adding more insights and understanding, it distinguishes between conceptual and concrete and demonstrates that the student makes pragmatic choices about the relevance of learning.

D4: Data analysis using grounded theory principles

Transcript code: DS400209	Coding 1	Coding 2	Memo
Q: Which do you think of these assignments contributed least to your learning?			
Umm. From a contextual point of view I would have to say that it was the position paper. That is not in and of its nature – if it is not in and of the position paper that that was the case. I think it was for me a situation where I didn't actually have the time that I needed. I felt harried and harassed. I wasn't satisfied with the outcome basically. I felt like I needed another week. I think a lot of it was just a negative feeling about it. Maybe it was not necessarily - it did contribute significantly to my understanding of the course because you needed to go back and refresh and you needed to apply in depth what you learnt. So without the position paper, I think, my level of understanding wouldn't have been as good as it was but the thing is in doing the position paper I got that level of understanding and then I just never had the chance to perfect it. So I think that was more of a frustration thing.	Feeling a sense of accomplishment as factor in learning, having time to produce a satisfactory application of what was learnt. Time a factor in ability to realise full potential of assignment for learning Recognition of value of activity but not managing to fully realise it. Weighing the balance. Experience negative due to how felt about having to do the assignment. Assignment as contributing to understanding in the course.	Affective factors have consequences for extent of engagement. Making trade-offs Emotional climate of experience	Different students interpreted the activities differently, i.e. those they liked and felt good about and those they did not. In some cases there is a *trade off* or *weighting the balance* i.e. recognising the value of an event/activity without feeling the satisfaction of accomplishment. At this stage it is not clear that this is about epistemologies. Self-monitoring, value learning when personally satisfied with the outcome, this is aligned with the course expectation of self-authorship (some characteristics).

D5: Open Coding- assigning codes to data fragments, first round.

Interview transcription fragment	Codes	Revised codes
Interviewee X: "...I *think it was just a question of in that situation I was a little bit off the base and so trying to keep up with the speed that the process was being driven at. … we finished long, long, long before the B group and as much as I appreciate that (Person 1) and (Person 2) were driving the process and they seemed to know what they were doing but at the same time if I'm going to be honest, in retrospect I think they were driving it a little bit too fast for me. So I found it difficult. I learnt a lot from them and I learned quite a bit in doing it but I think being accustomed to being a more active member and being able to contribute to things like that. Being in a situation where I was learning and listening and taking rather than contributing as much as I would have like to have was, it was a bit difficult. Nobody likes to feel like the slow kid in the group and I think, it is just one of those things you are used to being in a driving role when you are forced to sit in the back seat it is a little bit, I wouldn't say humiliating, but humbling I think. In that sense it was good but it was still difficult."*	• Having pace of work driven by other members of the group • Trade off in learning process, learnt from others but preference for more active contribution • Participated at uncomfortable pace • Forced to take a back seat in learning process • Seeing value in a difficult learning process	• Pace of learning process • Awareness of learning identity • Group dynamics • Individual characteristics • Group work as pedagogical device • Role in the group
Interviewee Y*: The group work, I learned a bit – a strange group of people ... the group work because it is different and*	• Group work as challenging and different	• Group work as pedagogical device

also you, it challenges your ability to manage your mental models, if you work in a group 'cause when people are noisy, it reflects one thing, and when they are quiet it reflects a different thing. So once you go up and down that ladder of inference it requires maturity and a bit of discipline to manage your mental models. I think the group work is most probably the most interesting part.	• Group work challenges your ability to manage your mental models • Reading signals from participation of others in group process • Ladder of Inference for reviewing perceptions • Dealing with perceptions/challenges requires maturity and discipline i.e. personal/individual characteristics. • Group work as an interesting learning experience	• Learning about self • Applying the course language of awareness to describe experience of learning • Triggers for reviewing mental models • Awareness of perceptions • Learning from engaging with others
Data Fragment		
I am saying that if the weekly reflection is more directed, telling you to do something as a student rather than you having done something or supposedly have done something, or something has happened in your work place. Where it's a discretionary, the onus is on the student and it is a kind of discretionary type of thing, to say look you must, you've done now this couple of weeks of theory, how does this now live itself out in your practice, can you tell us on a weekly basis, what has happened. Where I would say do it the other way round, if it's, instead of ten weekly reflections, have five, but let's go for specific stuff and direct it or you can choose your menu as a student from the theoretical principles of concepts or any of the aspects that you have done in your management practice	Student has discretion to select what they like from the theory Preference for compulsory engagement and direction by facilitator (as person setting assignment).	Asking for more structure in relating theory to practice Way out for those who do not want to engage with aspects of the theory as they have discretion. Advocating alterative based on preference.

theory by saying, "Look in that 14 days, you Mr Manager, in your work environment, you must do one of these and write it up." I would prefer doing it that way, where it is a compulsion, more directed.	

Appendix E: Examples of assignments

E1: Intermodular assignments

Course assignments	
Group position paper	Module 1: Analysis and synthesis of concepts and theories reframed as a theory of management or organisational practice. Module 2: Typically a problem situation will be presented by the facilitator in the form of sources of information through media clips etc., the students will required to apply methodologies presented in the module e.g. Soft Systems Methodology, to the problem situation.
The Position Paper	The position paper is a process where the instructor provides scaffolding guidelines for theory building. The assignment brief was adapted for each cohort. Candidates were asked to select concepts (from literature and lectures), categorise these concepts, identify the relationships between the categories based on logic internalised from an understanding of the discipline and then present an argument advocating this theory.
The Action Research Report	The requirement was for an appropriate diagnosis of a systemic problem using techniques for root cause analysis and development and implementation of appropriate solutions.
The Critical Incident Log/Reflective Paper	Documentation of a process of self-reflexion where habitual personal practices and co-producers are intended to be described in order to identify areas for development.

Appendix F: Propositions from grounded theory findings

Proposition 1

Learning for systems thinking is initiated when systems ideas and concepts such as holism and interconnectedness are implicitly or explicitly perceived as a catalyst through making sense of past or present aspects of the world.

Proposition 2

In a new learning environment, events can be interpreted as cues in a gestalt moment, setting up expectations for what is to come.

Proposition 3

The catalyst can be discovered as a consequence of reflection on a learning event and motivate engagement.

Proposition 4

New ideas, personal expectations, initial impressions and interactions with others contribute to a sense of anticipation even without clarity on what the final outcomes of undertaking the journey of academic study will be.

Proposition 5

In a new learning environment, new experiences fuel comparisons with past experience which provide a foundation for making sense of the experience.

Proposition 6

In a new learning environment, learning events are measured against personal agendas to frame potential consequences of participation.

Proposition 7

The quality of assimilation of learning is a factor of both individual characteristics and abilities and interpretation of mediating elements as facilitating or inhibiting learning.

Proposition 8

Mediating elements can accelerate learning or motivate people to learn at a deeper level.

Proposition 9

Linking back to prior knowledge facilitates engagement with new ideas through points of reference for understanding.

Proposition 10

The quality of assimilation is impacted by the potential of the learning event to make sense by linking back to prior knowledge.

Proposition 11

The quality of assimilation is impacted by the potential of the learning event to stimulate of interest of the individual.

Proposition 12

The quality of assimilation is impacted by the extent of synergy with the facilitator's style or content in a learning event.

Proposition 13

By validating prior knowledge and engaging students with their enthusiasm and style, facilitators promote the engagement of students.

Proposition 14

Personal and context promoted learning initiatives are needed for knowing change.

Proposition 15

In an environment characterised by variety in learning events, persistence and self-motivation as individual characteristics and personal disposition is viewed as an active rather than passive dimension of this phenomenon.

Proposition 16

When learning systems concepts, the activity of assimilation can contribute to the maintenance of frames of reference through personal, affective and social mechanisms.

Proposition 17

If engagement through pedagogical activities is perceived as ineffective by the student, known learning initiatives can be used to overcome constraints and lead to improvements in knowing.

Proposition 18

If the causes of lack of engagement are primarily external to the learner, learning initiatives can be used to promote the desired quality of learning through drawing on personal learning strategies.

Proposition 19

Initial scepticism of events is addressed by active engagement through suspending judgements to generate knowing motivated by academic assignments.

Proposition 20

If you have knowledge of systems tools and methodologies through active engagement, you have the means to reframe problems and address them in a way you could not before.

Proposition 21

If you have knowledge of systems concepts through active engagement you have the means to challenge your thinking about organisational problems and gain different outcomes.

Proposition 22

If you have knowledge of systems ways of thinking through active engagement, you can frame and design problem solutions through creating collaborative interventions.

Proposition 23

If you have knowledge of systems ways of thinking through assimilation, you have a different way of thinking about situations.

Proposition 24

Learning events provide opportunities for engagement for recognition and change of undesirable behaviours with the consequence of personal development.

Proposition 25

Context directed learning initiatives can lead, through expansion of the triggers of utility and relevance, to improvements in knowing, with the consequence of promoting variety.

Proposition 26

The group provides an opportunity to engage with personal assumptions to confirm or review them for knowing worldview change.

Proposition 27

Interaction in groups can contribute to recognition in errors of knowledge and the means to address them.

Proposition 28

The groups have potential as a resource for consolidation and understanding of new concepts and theoretical ideas.

Proposition 29

The group interaction provides potential opportunities to facilitate the shift from assimilation to knowing change through collective initiatives.

Proposition 30

The group interaction provides potential opportunities to facilitate the shift from assimilation to knowing change through contributing to consolidating and understanding.

Proposition 31

The group interaction provides potential opportunities to facilitate the shift from assimilation to knowing change through facilitating and supporting reflexivity.

Proposition 32

If the context is not experienced as coherent, the group can be used as a resource to facilitate understanding through facilitating and supporting reflexivity.

Proposition 33

Moving from the anticipation of the potential of systems concepts to assimilating the concepts can be facilitated by mediating elements through contributing to understanding, inspiring, improving practice, changing thinking, validation of what is already known and providing new ways of seeing the world.

Proposition 34

Something e.g. the facilitator, becomes a mediating element when it is recognised as contributing to deriving value from the activity in a way that could be aligned with learning's or in ways that were not anticipated.

Proposition 35

Readiness to engage offers agency for developing insights beyond what was provided in formal course lectures or readings and resulted in context relevant knowledge.

Proposition 36

In cases of scepticism of an event as a learning opportunity, suspension or revision of judgements in the face of evidence of desired consequences, for example, if it works in practice, is made possible by the disposition of individuals, in other words, exercising agency.

Proposition 37

To facilitate coming to know, the use of known initiatives from prior use i.e. those that were not directed or proposed through the course activities; such as individual research, use of mind maps, and asking others, to extend frames of reference.

Proposition 38

Integration is a consequence of negotiating application, adapting within contextual constraints; and combining of knowledge forms.

Proposition 39

Appropriate integrative action is impacted by constraints of the context of application.

Proposition 40

When you apply systems methodologies in a work environment, you require skills and knowledge to adapt them to that particular context.

Proposition 41

When you address a work problem, systems techniques can be used to design sustainable solutions through identifying root causes.

Proposition 42

When you address a problem in the work context, systems tools, such as rich pictures, create shared understanding through facilitating collaborative problem insights and interventions.

Proposition 43

When you address a problem in the work context, adapt methodologies to produce context relevance interventions by disaggregating them while maintaining theoretical coherence.

Proposition 44

Assimilation of systems concepts can be promoted through stimulating intrinsic interests.

Proposition 45

A work based academic assignment is a context for application of and experimentation with systems ideas to design improvements through adopting a collaborative approach.

Proposition 46

If you have a work based academic assignment, it is an opportunity to integrate and apply systems tools and concepts for making meaning, and adapting frames of reference through experiential learning.

Proposition 47

The phase of integrating and adapting involves the acknowledgement of knowledge as uncertain and could be judged on the basis of evidence and context.

Proposition 48

In the learning environment designed for students as co-producers, they become alert to the possibility of their role as an active participant in the *starting out* phase; during *assimilation* their efforts have a direct impact on the quality of their learning outcomes.